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AMERICAN JOURNAL OF OPTOMETRY

OCULAR ELECTROTHERAPY

J. I. Kurtz, B. S., A. O., F. A. A. O.
Minneapolis, Minn.

CHAPTER I.

THE DEVELOPMENT OF ELECTROTHERAPY AND ELECTRICAL THEORIES

Introduction

Electrotherapy is the application of electric and radiant energy for therapeutic purposes. It is the electric part of a complex therapeutic system known as physiotherapy.

In recent years a new therapeutic system has been developed and in a measure scientifically perfected, called "Physiotherapy." This system is rather complex and is made up of chemicaltherapy, mechanotherapy, hydrotherapy and electrotherapy. It is in the last one that we are interested and in the following pages we shall outline briefly the underlying principles of electrotherapy and describe the technic of application from the standpoint of those who are interested in applying this agent as a compliment to the present day accepted standard ocular methods of treatment and not as a supplement. The electrotherapy field is broad and the subject is new and only slightly developed. The indications of today may be the contraindications of tomorrow.

My main aim in writing this series of articles is to initiate the interest of optometrists in this subject, which is purely a study of electricity and radiant energy and their therapeutic application from an optometric standpoint. In other words, this is a study of physics which makes up the major part of an optometric college curriculum.

In bringing this subject of electrotherapy to optometry (Electric and Radiant Energy Therapy), I am fully conscious of the fact that I will meet with criticism from some quarters as to why optometrists should interest themselves in this subject and by so doing perhaps seemingly encroach upon the field of others. We may be able to get

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a clearer view of this matter if we analyze this therapeutic agent a little further. Will optometry, by interesting itself in the study and application of electric and radiant energy therapy, encroach upon the field of others? And what are these fields of others? Is it Osteopathy, or Chiropractic, or Naturapathy, or Medicine? If so, which? The answer to this question can be given only in the negative, because of the fact that all of these professions just enumerated are more or less extensively using electrotherapy and no one school of practitioners seem to have a monopoly either on the knowledge or lack of knowledge on the subject. From my personal investigation I have found a decided lack of scientific knowledge on the subject by most of the electrotherapy practitioners no matter to what school they belong, and that their knowledge is limited mostly to the literature furnished by the different electric instrument manufacturers. This statement is true with very few exceptions, to be sure. Here and there a practitioner will be found to possess some knowledge of the underlying basic principles of electrotherapy but these are few. That this state of affairs exists is to be regretted and to some extent we can find a rational reason for this lack of knowledge, because most of the schools these practitioners graduated from do not prescribe physics in their curriculum as a major study and some of these schools a few years back probably did not include physics in their curriculum at all. There is, however, no rational reason why the modern optometrist, whose major study is physics, should not be interested in these subjects. Electric and radiant energy therapy, optometrically applied, are therefore to my mind absolutely within our field. Is it not also true that as optometrists we are working with radiant energy constantly in our daily practices?

No one should deny us the right to think, study or even be interested in anything outside of pure refraction. Our thinking process should not be stopped by any group, or circumscribed by any boundaries. Science is international and knows no limitations or boundaries geographic or legislative.

There is no profession in existence today which is strictly limited to its own field and is not overlapping to a certain extent some other field. Certainly no one would claim that medicine is strictly confined to its own field, if it were there would be no such a thing as medical-psychology, medical-electricity (diathermy), medical-raytherapy, etc. Certainly no one can claim that the profession of osteopathy is limiting itself to the study and application of subjects purely of an osteopathic nature. Again let us look at the psychologist, what is his field of study made up of, of psychology? Yes, but what is psychology? It is a combination of anatomy, physiology, neurology and some principles about human behavior? Or is dentistry merely confined to purely dental subjects?

No there is hardly a profession in existence whose field of study

and interest is so limited that it does not to some extent, at least, overlap some other allied field.

It is the writer's contention that a knowledge of the principles of electrotherapy will enable the optometrists to render a better service to his patients no matter whether he is applying this therapy himself or is co-operating with one who is specializing in electrotherapy.

The critics may claim that the use of electricity and radiant energy as a therapy is dangerous and therefore should be confined only to these who are expert in their application. This point we grant but it is equally true that the surgeon's knife is dangerous in the hands of the unskilled. The X-ray is more than dangerous in the hands of any technician who does not understand its use. Even the prescribing of prisms is very harmful unless the one who prescribes them is thoroughly versed in principles of neuro-optics and applied refraction. So it is also true with electrotherapy.

No one should attempt to use this therapy unless he has made a thorough study of its principles and applications. This once done, the element of danger is almost completely removed. Bordier,[1] who is generally acknowledged as one of the greatest authorities in France on the subject of electrotherapy states that, "We must also remember that diathermic treatments are painless, devoid of risks to the patient and can be continued as long as desired."

At this point the writer wishes to make himself perfectly clear as to his stand on this subject. He does not favor the application of electrotherapy by any one who has not made a study of the subject no matter to what school of practice he belongs. It is a fact to be regretted that at the present time electrotherapy is practiced by many practitioners of different schools holding the licenses of various state boards, but who themselves have little or no knowledge of the subject. There are also cases were certain persons holding no license to practice any kind of therapy are taking up the practice of physiotherapy. This is unquestionably unfair to the public and all signs indicates that legal statutes will be enacted in the near future to restrict the use of this new agent only to those who are competent to use it regardless of the school to which they belong.

Historical

Electric Therapy and Radiant Energy Therapy are only a part of a recently developed system known as physiotherapy. The technic of electrotherapy has been largely developed by French scientists and it is claimed that France is today by far more advanced in this special system of therapy than any other country. Students of electrotherapy are well aware of the fact that this form of treatment was placed on a scientific basis only as a result of the labors of French scientists. While this specialty of heat and light therapy can

be traced back to the writings of the ancient Greeks, yet every modern student of this subject, no matter what country he lives in, is cognizant of the fact that the Father and Founder of this interesting subject Electrotherapy is that famous scientist, Duchenne, of Boulogne, who was described by another leading French scientist as "the man who has played a preponderating part in the researches and discoveries upon which the edifice of neuro-pathology has been erected." Duchenne himself claimed that "these discoveries resulted from a method of electrization, which surpassed his expectations in yielding scientific and practical results of the highest importance." Others who have written extensively on the subject are Professor Bergonie, Drs. Miramond, Laroquette, Nogier, Bordier, Beclere, Larat, Regaud, Max Roques and Desplats.

Electrotherapy has been practiced to some extent in this country since the first part of the twentieth century by practitioners of different schools the knowledge of the subject was meager, the instruments crude and the technics used were considerably inferior from those we have today. Many of the practitioners, medical and non-medical who applied electrotherapy in their practice were looked down upon as quacks and this system of therapy was for years refused recognition by the American Medical Association.

It is only within the last few years after the completion of the World War that the science of electrotherapy was given recognition by such conservative a body of practitioners as the American Medical Association.

Several leading universities have recently opened their doors, which were formerly closed to this subject. Physiotherapy departments have been organized and the subject is now sucessfully taught and applied in the clinics of these leading universities.

The Evolution of the Electric Theories

The development of applied electricity has taken place since the latter part of the nineteenth century. This, however, is not the period when the first views on theory of electricity were conceived. So far as is known the automic theory of matter and the modern kinetic theories of matter have been developed only since the year 1800, and are therefore only somewhat over one hundred years old. It is only since 1851 that we have gained some definite knowledge about molecules and atoms, when Jaule[2] in England made the first absolute determination of a molecular magnitude, that is that the average speed with which gaseous molecules of a given kind are darting hither and thither at ordinary temperatures. In 1860 Clark Maxwell succeeded in computing the second molecular magnitude. This is the mean distance a molecule of gas moves between collisions, and it is called the mean free path of a molecule. It was also in 1860 that investigators succeeded in making any kind of an esti-

mate of the number of molecules in a cubic centimeter of gas. At the present time with the advancement of our store of knowledge it is possible to count this number with greater precision than can be counted the people of any large size city, in spite of the fact that the number of molecules is over 27 billion-billion. While these findings by Maxwell and others mark the beginning of the development of the molecular theory of electricity it is a well accepted fact that almost all qualitative conceptions of the atomic and kinetic theories were developed some thousands of years ago. Tyndall's[2] statement of the principal of Democritus indicates how complete the atomic philosophy had developed 400 years B. C. This was later destroyed by the attacks upon all civilization by the barbarious tribes surrounding them at that time.

Democritus' principles as quoted by Tyndall are:

1. From nothing comes nothing. Nothing that exists can be destroyed. All changes are due to the combination and separation of molecules.

2. Nothing happens by chance. Every occurrence has its cause from which it follows by necessity.

3. The only existing things are the atoms and empty space; all else is mere opinion.

4. The atoms are infinite in number and infinitely various in form; they strike together and lateral motions and whirlings which thus arise are the beginnings of worlds.

5. The varieties of all things depend upon the varieties of their atoms, in number, size, and aggregation.

6. The soul consists of fine, smooth, round atoms like those of fire. These are most mobile of all. They interpentrate the whole body and in their motions the phenomena of life arise.

These principles with some slight modifications are in complete accord with the atomic philosophy of today.

There are no electrical theories which date back of Benjamin Franklin (1760) other than the discovery of the Greeks that rubbed amber had the power to attract to itself light objects. In 1600 A. D. Gilbert, Queen Elizabeth's surgeon, and one of the greatest scientists of his day, found that a glass rod and some 20 other bodies when rubbed with silk act the same as the rubbed amber of the Greeks. Gilbert described that phenomenon by stating that the glass rod became electrified, which is equivalent to our present term, it has acquired a charge of electricity.

In 1733 Dufay, the French scientist, found that when sealing wax is rubbed with cat's fur, it becomes electrified, but it differed from the electrified glass rod in this respect that the sealing wax attracted strongly different electrified bodies repelled by the glass rod, and re-

pelled all electrified bodies attracted by the glass rod. He then claimed that there are two types of electricity. Benjamin Franklin in 1747 also recognized the presence of two kinds of electricity and applied to them the terms of "positive" and "negative."

The term positive he applied to electrified bodies repelled by a glass rod and the term negative to bodies repelled by sealing wax which was rubbed with cat's fur. This is exactly what our definition of *positive* and *negative* electrical charges are at present time.

Proof of the relation of positive and negative bodies was not to be had from any one until Faraday's classic experiment in 1837, that when we rub a glass rod with silk the rod becomes positively electrified and the silk takes up a negative charge of an amount equal to the positive charge received by the glass rod. And the statement was then made that positive and negative electrical charges always appear simultaneously and in exactly equal amounts.

The Two Fluid Theory

Symmer[3] in 1759 claimed that matter in a neutral state shows no electrical properties because it contains as constituents equal amounts of two weightless fluids which constitute positive and negative electricity respectively. According to Symmer a positively charged body is one which contains more of the positive fluid and a negatively charged body is one which contains more of the negative fluid. This marked beginning of the two fluid theory which again divorced electricity and matter which Franklin tried to bring together. This two fluid theory dominated the development of electrical science for over one hundred years.

The One Fluid Theory

Franklin tried to explain this positive and negative phenonema by assuming that an "electrical fluid" or "electrical fire" exists in normal amounts as a constituent of all matter in the neutral state, or when not electrified and that more than the normal amount is to be found in any body which has a positive electrical charge, and less than the normal amount is to be found in one which is negatively charged.

This theory of which Franklin[4] was the proponent differed from the two fluid theory in this respect. This latter theory assumed that there were three distinct entities, namely—*Positive electricity, negative electricity* and *matter*. While the one fluid theory reduced these entities to two, Franklin called them *matter* and *electricity*.

Stress and Strain Theory

The electric theory of stress and strain had been gaining ground during the years 1840 to 1900. During that period many of the physicists explained the electrical phenomena in terms of stress and

strain in the medium which surrounds the electrified body. They claimed that there was a definite something called a charge of electricity which was considered to be as existing on a charged body and had been imagined to exert forces on other charged bodies at a distance from it in the same way in which gravitational forces of the earth acts upon the moon or that of the sun on the earth.

Faraday assumed that it was the ether which acts as a transmitter of these electrical stresses and strains. Both Maxwell and Faraday claimed that it was not the conductor which carried the electricity, but focused attention upon the stresses and strains taking place in the medium about the conductor. An electric charge at that time was explained to be a "state of strain in the ether" and an electric current, did not represent the passage of anything definite along the wire but merely a continuous "slip" or "breakdown of a strain" in the material of the wire. Two types of electrical conduction, which were distinct from each other were recognized at that time—namely, electrolytic conduction and metallic conduction.

The Electron Theory

In searching for a plausible explanation as to the nature of electricity many theories were advanced, some of them have been briefly mentioned in the preceding pages. It was not until Sir Joseph J. Thompson, Professor of Physics at Cambridge, discovered the *electron* that a satisfactory electricity theory had been advanced.

Previous to Professor Thompson's discovery it was believed that the atom was the smallest hypothetical subdivision of matter. Later on the existence of the atom passed out of the hypothetical state and became a proven fact. Hull[5] claims that we know definitely that the "atom is a real object of definite shape and size. We know what it is made up of, we know its exact speed when it flies about a gas and lastly, we know its exact position when it forms a part of a solid body."

If an atom be magnified ten million times it should have a diameter of about 1½ inches. With this magnification the innermost electrons will appear to follow an orbit about ten feet from the center of this atom and the outermost ones will appear to be about one-half to two-thirds of a mile distant.

The Characteristics of Electrons

They are small in volume and are of extreme speed. It takes much power to break up atoms and to start electrons, but if they are once started they require very little force to keep them moving. In a general way atoms of any substance are made up of electrons. When properly concentrated electrons produce extreme heat, which will melt any known substance. Thompson claims that the electron is a billion times smaller than the smallest particle which we can see

through the aid of the most powerful miscroscope, yet it is in itself a tangible entity of electricity. Thompson[6] also states that "Investigators have shown that these negatively charged particles are widely diffused and form a part of every kind of matter." He also claims that the entire mass of every material atom is made up of electrons which are circling about a nucleus of postive charges of electricity called *protons*. And, to give a comparison of their relative size, he says also that "Small as the atom is, it is large enough to provide relatively vast space in which the infinitesimal electrons may revolve. This space between the electrons might be compared with infinity in which the earth and its companion planets revolve about the sun." And further that "the speed of the electrons and their mutual repulsion would result in driving them instantly off into space, were it not that they are held in check by the attractive influence of the positive electric charge of the atom."

The number of protons and electrons of any atom are the same when the atom is in a normal balanced state. An *atom* becomes an *ion* when it becomes electrically unbalanced. When an electron or any number of them escape from an atom it is left positively charged and the atom to which the escaped electrons become attached becomes negatively charged.

It takes great force upon an atom to dissociate it into electrons. The electron when once set free travels at a very high rate of speed, about 186,000 miles per second. Through this speed an electron when once set in motion gains so much momentum as to attract to itself, as it moves along millions of electrons, and thus become force known as an *electric current*.

The *electron* is the unit of negative electricity while the *proton* is the unit of postive electricity.

We are usually taught that there is a postive and negative pole to an electric current, however from the standpoint of the electron theory of electricity we learn that it is a negative stream of *electrons* which are seeking *protons* to balance themselves electrically. According to this explanation then, an electric current moves to and not from the postive pole of a battery.

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BIBLIOGRAPHY

[1]American Journal of Optometry, Vol. 5, No. 4, p. 136.
[2]Phil. Mag. XIV (1857), p. 211.
[3]R. A. Millikan, The Electron, p. 8.
[4]R. A. Millikan, The Electron, p. 13.
[5]R. A. Millikan, The Electron, p. 16.
[6]B. B. Grover, High Frequency Practice, p. 11.
[7]B. B. Grover, High Frequency Practice, p. 14.

A QUESTIONNAIRE ON THE ASSOCIATED FUNCTIONS OF CONVERGENCE ACCOMMODATION AND FUSION

In the effort to broaden our understanding of the associated functions of convergence and accommodation the following questions were sent to Dr. Ivan S. Nott and several other men whose outstanding work in ocular myology makes their views on these matters of the utmost importance and we believe of the greatest interest at this time. We will publish in subsequent issues the views on these questions, of other of our practitioners.

The questions are as follows:

What is the relation between esophoria (excessive convergence) at the near point in the young adult and high exophoria (convergence lag) in the presbyope?

Is the one the forerunner of the other? That is, can we expect the young adult with excessive convergence at the near to have convergence lag of high amount at the near when he becomes a presbyope?

If not, why is it, that convergence excess at the near is the common imbalance found in the young while convergence lag is usually associated with the presbyopic period. Why is it, that the percentage of convergence excess cases found among young patients dovetails with the precentage of convergence lag cases found in the older ones? Why is it, that the young patient who shows a convergence excess is as a rule the ardent, energetic, "doer" type and this also holds true of the average presbyope who shows a convergence lag? Are these facts mere coincidence or do they point to the fact that convergence excess at the near in the young adult presages convergence lag in the prebyope?

If it can be demonstrated that the convergence excess of the young adult turns into the convergence lag of the older patient, what is to be done about it?

We know that uncorrected hyperopia, hyperopic astigmia, over corrections of minus, prism power base-out, wide interpupillaries and pathology cause excessive convergence. What other factors are causative?

Does a convergence excess at the near always keep company with a faulty, incomplete, or imperfect fusion sense?

If so, is it this lack of positive binocular fixation or anchorage, associated with faulty fusion, which permits the development of a

convergence lag when the accommodation no longer functions unaided at the near point?

Further, what factors contribute toward the conversion of a convergence excess into a convergence lag? We know that over-corrections of plus, especially reading corrections for presbyopes, and base-in prism power gradually bring about convergence relaxation, which can result in a convergence lag. What other factors produce this result? Do small segment bifocals tend to cause convergence lag by the disturbing effect they may have or near point fixation? Are large segments conducive to easier near point vision when there is a convergence lag present?

If prism power base-in only tends to convert one distressing condition (convergence excess) into another (convergence lag) over a period of years, is it not questionable procedure to use such prism power either for wear or exercise without close and constant supervision of the case? Should not the use of such procedure always be accompanied by fusion training?

Is correction of a faulty fusion sense the surest and sanest way to establish comfortable ocular balance? If so, should not all orthoptic training stress the development of greater fusion power?

These questions are asked with the view of clearing up the haze surrounding the whole question of ocular imbalances. We believe that the group mind of our leading optometrists can solve the problems of ocular balance and set our feet upon the pathway of clarity and established facts.

The answer to the above questionnaire, by Dr. Ivan S. Nott, will be found on the following page:

CONVERGENCE, ACCOMMODATION AND FUSION

Ivan S. Nott, Opt. D.
Toronto, Ontario, Canada.

The rather rambling remarks of this contribution to the Journal are the result of a questionnaire received, with the request that I submit an article, and endeavor to express an answer to each question. This I have done to the limit of my ability, but have found it difficult to render an opinion in a brief manner, and so have strayed far and often from many of the questions.

The questionnaire, if it can be answered, should go a long way towards deciding many conflicting and confusing theories and their practical application.

But the first great important necessity is obtaining accurate data. A correct diagnosis cannot be rendered on inaccurate and insufficient data. To this end the proper handling of an ophthalmoscope, ophthalmometer, retinoscope (both static and dynamic) subjective tests, tonicity and duction tests, accommodative, convergence relationship, reserve convergence, and condition of fusion faculty are all important in the ocular examination. It should be possible for two optometrists making an examination of the same pair of eyes to obtain essentially the same data. With the same data before any optometrist the diagnosis and procedure should be the same, but herein enters the individual judgment, and so, even were it possible for all optometrists to have the same knowledge and training, there would still be the difference in individual judgment, and also the fact that every pair of eyes are a law unto themselves.

Convergence is a binocular function that we do not have when we come into this world, and as for fusion, we have very little of it. The vacant stare of the new born babe, with considerable wandering of the visual axes, must mean a great deal of diplopia. There is considerable associated movement of the eyes in the vertical meridian at birth, but very poor co-ordination for the horizontal, and no co-ordination in what we call convergence.

Before we have been here long, the vacant stare becomes less vacant, and binocular single vision is established with good vertical and horizontal co-ordination. Soon after we can detect convergence, but very poor at first and difficult to maintain. The time passes, and if the infant has been free from shock, fright, serious illness, malnutrition, and accident, fusion is firmly established and developed with convergence and perspective.[1] Worth estimates that the fusion

1—Squint by Claud Worth.

faculty is in the process of development until the end of the sixth year. It seems then, that when we come into this world we have little or no fusion, and no convergence. They are both acquired after we begin our earthly existence.

Convergence is not simply the power of the internal recti muscles to turn the eyes in, nor is it altogether a matter of nerve innervation to the interni. Many people who have a large exophoria, or what appears to be an insufficiency of convergence, have no difficulty when one eye is covered, in turning the uncovered eye in to the limit. Obviously the muscle power and nerve innervation are ample. But when the binocular function of convergence is attempted these same people will only show a near point of convergence, of from five to ten inches. It is a problem then of fusing or blending two objects into one. It is in the fusion faculty that singleness of vision takes place, and I believe that when there is sufficient development of this fusion faculty the necessary impulse is released, and the interni respond accordingly, always excepting of course paresis, paralysis, and injury to the ocular muscles, and constitutional diseases.

From my experience, knowledge and study of squint I have come to believe that Worth is right in his contention that the essential cause of squint is a fault or defect of the fusion faculty, and that the refractive error is not an important factor until the squint appears, and then it becomes a very important consideration. If hyperopia was the essential cause of convergent squint all hyperopes of an appreciable amount would have convergent strabismus, but we find any number of children with 3.00 D. and more of hyperopia, but with no convergent squint. We also see numerous adults of 3.00 D. or more of hyperopia, but with no convergent squint, and these men and women were children once.

Again we see convergent squint in children, and adults with little or no refractive error. Occasionally we see myopes with convergent squint, and we often see divergent squint with hyperopia, and also both convergent and divergent squint with little or no refractive error.

The reason why convergent squint is so often associated with hyperopia, is that when the fusion faculty is unable to maintain single vision, the direction of the pull is in, and that is the way that one eye goes. Eliminating that pull by correction of the hyperopia encourages parallelism of the visual axes at infinity, and relaxation of the accommodation at all close work by extra plus sphere, or by the use of bifocals (a splendid practise) further encourages a relaxation of the excessive convergence. By suitable stereoscopic training, fusion can then be established, cultivated and developed, so that when the plus correction is removed the eyes will remain straight, because there is now sufficient desire or anchorage for binocular single vision, and fusion strong enough to resist the pull from the hyperopia. The same as many children and adults who have an

appreciable amount of hyperopia have binocular single vision and fusion without their correction. True, they may have an accommodative esophoria from the uncorrected hyperopia, and probably the maintenance of binocular single vision along with the strain on the accommodation and fusion, may cause ocular discomfort, but nevertheless there is no squint.

A very large percentage of squint, (probably all), can be traced to shock, accident, sickness, malnutrition, etc., before the age of six years. These things retard or stop the development of the mental processes that govern vision, (fusion faculty). The time is coming when our children will not enter school until they are seven or eight years of age, and not until their eyes have been properly examined for refractive errors, and what is just as important the condition of the fusion faculty. I believe the development of the fusion centers is as important, if not more important, than refractive errors with the exception of large errors. Furthermore I believe that we shall come to the conclusion that the age of seven, or possibly eight, is early enough for children to begin their education, for the reason that the fusion faculty does not usually attain its full development until the age of six has arrived. When the time comes that all children are properly examined for errors of refraction, and condition of fusion faculty by experienced operators, and the proper assistance and training has been given to those that need it, then, and not until then, can we expect to make any real advance in the elimination of squint from the human race, and at the same time place our children in a position, from an eyesight point of view, so that they can continue and finish their education without the tremendous handicaps that many now experience.

If it is true that the essential cause of squint (heterotropia) is a defect or fault in the fusion faculty, and that these defects or faults are the result of shock, accident, sickness, etc., before the age of six years, then it is only reasonable to contend, that many of the cases of heterophoria (latent squint) are from the same cause. Therefore, if we wish to eliminate these large amounts of exophoria, esophoria, and hyperphoria it would seem that the earlier we get these cases the better our chance of success. I believe that our best chance of success is following along lines that nature pursues, that is, teach the mental processes that govern vision to blend two objects into one, instead of trying to break a single object into two.

The fusion faculty is the dominating factor controlling binocular single vision. Given a properly developed fusion sense, and there can be no squint except from paralysis, paresis, or traumatism, and there can be no heterophoria worth bothering about, except that caused by refractive errors, which of course will disappear when the eyes are properly corrected. If this is so, we should, where routine ocular examination reveals binocular imbalance and ocular discom-

fort (not the result of ametropia) make a study of the fusion faculty as follows:

1. Perspective.
2. Suspenopsia and Suppression.
3. Quality of Fusion (Intensity of Desire).
4. Quantity of Fusion (Amplitude).

A good method for this purpose[2] is to use a phorometer stereoscope with a suitable attachment for placing the Dr. Wells' selection of charts[3], and after adjusting the phorometer sterescope to the individual needs of the patient, proceed with the E, F. G, and C cards. This examination will very often reveal why a pair of eyes do not and cannot function properly, and what is better still the stereoscopic treatment will restore binocular comfort.

Convergence is a binocular function and as many authorities have determined is normally distributed in non-presbyopes about two-thirds directly associated with the act of accommodation (accommodative convergence) and the balance, about one-third, in the interests of binocular single vision, and supplied by the fusion centers (fusion convergence). This means, that with a patient orthophoric and emmetropic, or made so with lenses, and with P. D. of 60mm., 18$^{\Delta}$ of convergence is necessary to see single at one-third of a meter. This is obtained by multiplying patient's P. D. in centimeters by the meter angles of convergence; i. e., $6.0 \times 3. = 18^{\Delta}$. Normally about two-thirds (12$^{\Delta}$) of this is associated with the act of accommodation, and the balance, about one-third (6$^{\Delta}$), is supplied by the fusion faculty.

To my mind it was nature in her wisdom that set up this condition, for when one fails the other attempts, and usually succeeds, even if uncomfortably, to take up the burden. Hence when we become presbyopic and lose our accommodation, and the same is replaced with convex spheres, the accommodative convergence that was associated with the accommodation also diminishes and fusion convergence has to fill the gap. Of course then we get an abnormally high exophoria at thirteen inches (with presbyopes), and if the fusion convergence is not ample to take care of this abnormal demand, and if it cannot be made so with suitable training, I cannot see why prism base-in to relieve the convergence for close work is not just as sensible and practical as convex spheres to replace the lost accommodation.

Some writers speak of this exophoria at near as convergence lag, and refer to it as an abnormal condition that should not exist. To my mind convergence lag would be a more appropriate term for an insufficiency of convergence. To me exophoria at one-third of a meter is not a convergence lag, it is fusion convergence in use when the eyes are functioning for all close work. If to some exo-

2—The Stereoscopic Development of the Fusion Faculty by I. S. Nott.
3—The Stereoscope in Ophthalmology by D. W. Wells.

phoria of 12Δ at, say, thirteen inches is convergence lag, to me it is simply the demand made upon the fusion centers to maintain binocular single vision, and as long as the reserve is ample, say, 35Δ I believe this to be a normal, or at least a comfortable condition.

On the other hand we have a patient who shows some 5Δ or 6Δ of exophoria at thirteen inches with a convergence reserve of only 10Δ to 12Δ. This to my mind is a convergence lag, or insufficiency of convergence, and I think that this patient would have considerable discomfort for all close work, particularly if the eyes were used for reading, writing, etc., for any length of time.

The procedure that I have found satisfactory for convergence insufficiency is stereoscopic treatment for development of the convergence. Very often the low convergence is accompanied by a faulty perspective and suspenopsia, and the quality of convergence of course is bad along with the low quantity.

Exophoria is a prolific cause of ocular discomfort, and very often something has to be done about it other than correction of the refractive error. As long as a patient has an ample accommodation I believe in an undercorrection of the hyperopia, with a full to even a slight over correction of myopia. It is best though to eliminate the exophoria if possible by suitable treatments, and in this respect I have had more success with the stereoscopic method than with any other. If treatment will not reduce the exophoria or only part of it, comfortable condition can usually be obtained by cultivating or developing a strong desire for fusion with a good quality and quantity of positive fusion power.

There is a better chance of eliminating or reducing the exophoria in non-presbyopes than in presbyopes. Possibly the main reason for this is that the older the individual the more difficult it becomes to train or develop the fusion centers, but another influence is the ciliary muscles and accommodation. In the young person with an active accommodation any form of convergence training will force nerve innervation to the ciliary, and to some extent this is beneficial providing it does not change an emmetrope into a myope, and a myope into greater myopia. In this respect stereoscopic training is in my belief the best method of repressing accommodation when it is desirable that it should be repressed, and still the method permits the use of accommodation where necessary.

As in other forms of heterophoria, there is much we have yet to learn about exophoria. The many investigators, particularly those venturesome souls who are not afraid to put their thoughts and experience into print, are adding to our store of knowledge. A decade ago we would have ridiculed many of the things we believe in today, and probably ten years from now the words expressed in

these lines will be obsolete due to more positive knowledge of the subject.

As in esophoria, exophoria is classified under the following headings:

Accommodative.
Convergence.
Accommodative Convergence.
Anatomical.
Pathological.

Accommodative exophoria is the simplest form, and the result of a myopic condition, and directly due to the non-use of accommodation for all close work, and, therefore, an inhibition of the convergence normally associated with the act of accommodation. Correction of the myopia causes the exophoria to disappear.

Accommodative exophoria can also be caused by over correction of hyperopia, and particularly by too strong plus for near work. The remedy of course lies in proper correction of the refractive errors.

Convergence exophoria may be the result of defects, or fault in the fusion faculty resulting in a poor convergence development, and poor innervation to the interni. The remedy is proper stereoscopic treatments for development of the fusion faculty, resulting in cultivation of convergence.

Convergence exophoria is also caused from wearing of prisms bases in when not needed, or in persistent use of glasses with prism bases in after they have obtained the desired result of breaking down a convergence excess.

An accommodative convergence exophoria is a combination of the two classes mentioned. The remedy lies in proper correction of myopia, and development of the fusion faculty with stereoscopic treatments. A convergence exophoria may develop into an accommodative convergence exophoria by the wearing of too strong a plus, particularly for near work. Proper refractive correction followed by fusion development will establish comfortable results.

An anatomical exophoria is what Duane has named "divergence excess." Stereoscopic treatments may reduce the exophoria to some extent, or not at all. I have seen several cases where after prolonged treatment all disassociation tests, such as Maddox rod, displacing prism, and Maddox double prism would show orthophoria at infinity, but with the cover test, the occluded eye would diverge. When such a condition can be obtained the patient is usually comfortable, due to the tremendous convergence reserve developed, together with the intense desire for binocular single vision. When treatments fail to budge the exophoria and discomfort continues,

prisms bases in for constant use are indicated or the anatomical position of the visual axes can be made parallel by operation.

Pathological exophoria is the result of focal infection, sickness, and disease. There are many varieties. If the cause is focal infection, the exophoria will usually disappear after the cause of infection has been removed or cleared up. Stereoscopic treatments are advised after the patient is free from the focal infection, if ocular discomfort continues. If the exophoria is the result of fevers and general systemic disorders it will usually disappear when patient regains his or her health. If ocular discomfort is present after recovery refraction should be carefully checked, also condition of fusion faculty, and if defective, treatments should be given.

Exophoria resulting from diseases such as syphilis, diabetes, cancer, tuberculosis, etc., cannot usually be helped by treatments. Prisms bases in are the only chance of ocular relief, and such eyes should be checked more often than usual as changes in binocular balance are sometimes very rapid.

If there is any relation between convergence excess (esophoria) at near in the young adult, and convergence lag (exophoria) at near in the presbyope the accommodation has an important influence. While I believe that convergence is the boss of accommodation there is no question but that accommodation can and does cause esophoria when over exerted, and exophoria when repressed. Therefore, if the young adult does show esophoria due to accommodative disturbance it is only to be expected that when presbyopia arrives the esophoria at near will disappear, and possibly turn to an exophoria.

Take for example a case thirty-five years of age where the occupation demands considerable close work. Assume there is 1.00 D. of manifest hyperopia, and with this before the eyes the balance shows at six meters eso. 2$^{\Delta}$, and at one-third of a meter eso. 3$^{\Delta}$. With an addition of + 1.00 D. sphere making a total of + 2.00 D. the eso. at near will be nil or possibly a little of exo. Now, if repressing the accommodation reduces an esophoria at near, and it usually will, then, it is only logical that with the coming of presbyopia and the necessity for an addition of + 1.00 D. reading there would be a reduction of the esophoria and possibly a creation of an exophoria. Furthermore if with dynamic skiametry observation[4] at sixteen inches, and fixation at thirteen inches there was revealed the extra + 1.00 D. when the patient was thirty-five yaers old, we would not hesitate to prescribe the same either as a special reading Rx or in a bifocal.

It is possible, that, convergence excess (eso.) at near in the young adult, is sometimes the result of defects or faults in the fusion faculty, but the writer feels that by far the greatest number are the result of civilization's tax upon the eyes, together with uncorrected

4—Dynamic Skiametry by Ivan S. Nott. Vol. 6, No. 4, American Journal of Optometry.

hyperopia. Where there is no hyperopia or hyperopic astigmatism manifest or latent, I think the esophoria is acquired something like myopia is acquired.

The wearing of prisms bases out, such as found in a too wide P.D. in plus corrections (a common fault) and too narrow a P.D. in minus corrections is a cause of esophoria. Over correction of minus is another cause of esophoria. The writer believes that a further cause is the sustained application of the eyes to close work, and, therefore an accommodation and convergence working more than they should. This results in an associated accommodative convergence, which from repeated and sustained activity does not relax to its normal relationship with accommodation.

It does seem as if the human race is fast becoming both myopic and esophoria. This is particularly true in cities where so many young people use their eyes at close work for long periods of time. Will another two or three centuries mean that evolution will adapt our eyes for the distance at which we are using them most?

Esophoria is classified under the following headings:

1. Accommodative.
2. Convergence.
3. Accommodative Convergence.
4. Anatomical.
5. Pathological.

Accommodative esophoria is the simplest form, and is the result of uncorrected hyperopia, either manifest or latent, or both, and is easily taken care of with plus correction. This class of case is seen almost daily with the busy optometrist, and the strongest plus correction that does not blur distant vision gives satisfactory results. For example:

Patient age 30. Occupation—Accountant. Asthenopia and discomfort wearing O.U. + .75 D. sphere.

Ophthalmometer indicates about one-half diopter astigmatism with the rule.

Static Skiametry O.U. + 1.50 D. sphere.

Dynamic Skiametry O.U. + 2.00 D. sphere (Observation 20″. Fixation 16″).

Subjective O.U. + 1.00 D. sphere (Binocularly + 1.25 sphere).

Eso. 6$^{\Delta}$ at 6 meters without correction.

Eso. 3$^{\Delta}$ at 6 meters with O.U. + 1.00 D. sphere.

Abduction with + 1.00 D. is 5$^{\Delta}$.

Exo. Nil at ⅓ meter with O.U. +1.50 D. sphere.

Exo. 3$^{\Delta}$ at ⅓ meter with O.U. + 2.00 D. sphere.

Rx given O.U. + 1.75 D. sphere for constant use.

Convergence esophoria is caused by prolonged close work, usually there is little or no hyperopia and frequently there may be a tendency towards myopia. This type of case is almost always accompanied with great ocular discomfort. Immediate relief is obtained by prescribing for constant wear prisms bases in to not more than one-third the abduction at infinity. Such a prescription is worn constantly until the esophoria disappears, when the glasses can be discarded or possibly worn just for close work only. The routine ocular examination in such a case will show data somewhat as follows:

Ophthalmometer about .50 with the rule.

Static Skiametry o. u. — .25 D. sphere.

Dynamic Skiametry Nil Obs. 20″, Fix. 16″.

Subjective o. u. — 37 D. sphere.

Eso. 1$^{\Delta}$ at infinity.

Eso. 4$^{\Delta}$ at thirteen inches. Pos. Res. 35$^{\Delta}$, Neg. Res. 12$^{\Delta}$.

Abduction at infinity 6$^{\Delta}$.

Rx given o. u. 1$^{\Delta}$ Base in.

An accommodative convergence esophoria is a combination of uncorrected hyperopia, and over stimulation to the convergence. In other words, it is a combination of the two varieties already cited. In this type of case there is some or considerable latent hyperopia, which dynamic skiametry will likely reveal, but which the patient will not accept for distance. The convergence is preventing the accommodation from relaxing. The use of as much plus sphere as possible, combined with prism base in will usually unlock the accommodation, and then more plus can be prescribed. In other words, by breaking the convergence domination, and by relaxing convergence the accommodation lets go also. Sometimes bifocals are necessary, and sometimes bifocals with prisms bases in. As the latent error becomes manifest the prescription is changed accordingly.

A case illustrative of accommodative convergence esophoria would reveal the following data:

Age 29.	O. D.	O. S.
Ophthalmometer	45.75 at 95 44.00 at 5	46.00 at 80 44.50 at 170
	— 1.75 × 5	— 1.50 × 170

Static	O.D. + .75 + 1.00 × 95 O.S. + 1.00 + .75 × 80	
Dynamic	O.D. + 2.25 + 1.00 × 95 O.S. + 2.50 + .75 × 80	Observation 20″ Fixation 16″

Subjective O.D. + .50 + .75 × 95
O.S. + .75 + .50 × 80

Eso. 3Δ at 6 meters)
———————— With subjective.
Eso. 2Δ at ⅓ meter)
Abduction at 6 meters 5Δ recovery at 3Δ.
Exo. 4Δ at ⅓ meter with Dynamic.
Pos. Res. Fus. Con. 24 — 30 — 18.
Neg. Res. Fus. Con. 12 — 16 — 10.

Rx Given
O.D. + 1.00 + 1.00 × 95 = ¾Δ B.I.
O.S. + 1.25 + .75 × 80 = ¾Δ B.I.
add + 1.25 O.U.

In bifocal form, to be worn constantly, and to return in six months for re-examination. If more plus is then shown at distance it is to be corrected.

An anatomical esophoria is where the patient is presbyopic with medium to high esophoria at infinity, with less esophoria, or exophoria at one-third of a meter. I am one of those who believe that there can be little or no latent hyperopia in presbyopia. Where there is little or no accommodation left, how can there be any hyperopia hidden in the lens? This kind of esophoria if it is associated with discomfort needs prism base-out incorporated in the distance Rx, and if this prism base-out interferes with comfortable close work, and such will be the case where there is an exophoria at near, or low positive reserve convergence, or both, there should be prism base-in segments incorporated, if the patient wishes bifocals, to an amount that will at least neutralize the prism base-out in the distance.

Pathological esophoria is the result of brain disorders, brain tumors, syphilis, etc. Obviously this class of case should be referred to the proper medical authority. In conjunction with the physician the optometrist can very often be of service to the patient by the use of prisms base out. The imbalance may change at frequent intervals, and very often it is necessary to alter the prismatic element to restore comfort or single vision. Orthoptic treatment of any kind is useless.

It has been suggested that small segment bifocals tend to cause a convergence lag by the disturbing effect they may have on near point fixation. The author is not in agreement with this suggestion because a 12mm. round segment properly centered for near point fixation, and correctly adjusted for vertical height, and when set at the right distance from the eyes permits the wearer a field of vision of slightly more than a ten-inch circle at a fixation distance of sixteen inches, and surely this is ample for all but accountants, book-

keepers, etc., because we can only see a few words at a time. I have fitted a large number of these small segment bifocals, and can recommend them very highly. They have splendid optical properties. The prism displacement is negligible, therefore, very little "jump of the image" and "blind area." Also when properly made and fitted the other two "jumps" of size and definition are eliminated, and there is a greater sense of freedom to the wearer.

The last two years have made many of us consider this bifocal question. Too many of us have thought of and prescribed just one type of bifocal with little or no thought of its optical principles. We have, many of us, nearly all of us, taken great care to ascertain a correct prescription, and then thoughtlessly placed a pair of bifocal lenses before the patient's eyes which are not by any means the best in any prescription, and are without doubt an abominable combination in some prescriptions, with the result that some patients suffer with an intolerable condition, and many others put up with a necessary nuisance.

As I see it the optometrist has three major functions to perform, all of them important if the best results are to be obtained. The first great essential is the prescription. For this purpose the optometrist must have technical knowledge, and skill in handling instruments.

The second consideration, and by no means an unimportant one, is the consideration of the lens, and particularly what double vision lens is to be prescribed. This is deserving of many pages that could be written about it, but I will content myself here with saying that Point Focal lenses in both single and double vision are none too good for the priceless possession of vision, and as for bifocal lenses, the quicker the optometrists stop fitting one type of bifocal for all patients, and the sooner that some thought is given to chromatic aberration, prism displacement, jump of the image, jump of definition, and jump in size, together with excellence of lens surfaces, the better for his clientele and his practice.

The third consideration, and by no means the least, is the placing of the lenses in the proper position before the patient's eyes. In this connection it is not out of place to mention the inspection and checking of lenses for accuracy of foci, axes of cylinders, proper centration, freedom from striae, bubbles in the glass, and perfection of polished surfaces.

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THE SENSITIVENESS OF THE UPPER QUADRANT OF THE RETINA AS THE CAUSE OF GLARE

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The subject of Glare in its various phases is now receiving considerable attention by both optometrists and lighting engineers. It has been renamed, but there has apparently been as yet no differentiation in the several varieties of Glare. One would hesitate a long time indeed in accepting the definition of this word, either in whole or in part: "Any defect of vision, ailment of the eye, or pathological disarrangement of the sight, which has been caused by light."

Glare has nothing whatever to do with a defect of vision, but what a "pathological disarrangement of the sight" might mean we shall be obliged to leave for the coiners of the phrase to explain. "Sight" is too broad a term for such brief explanations, and was put together by some mind which did not comprehend fully the factors. "Ailment of the Eye" is still more ambiguous. It is suggested that optometrists should not adopt such a term, nor subscribe to such phrases.

This article will be no attempt whatever to cover the whole field of Glare, but merely to point a few phases of those light waves which undoubtedly cause ocular embarrassment.

The focal mechanism of the eye, its cornea with the crystalline, in combination with the various interior and exterior distances, is enabled to bring parallel rays to a focal point, to gather in rays emanating from three or four inches from its nodal point when the accommodative factor is at its maximum, to accommodate at 10, 12, 16 to 24 inches as the near-point recedes toward infinity, at which time the eye can no longer assimilate divergent rays and focalize them satisfactorily upon its screen. Its maximum range under excessive conditions is about 14 diopters, which is to say that rays having that much divergence on impingement upon the eye may be focalised at its macula. The eye selects, from among the millions of rays passing its portals, only those which may be focalized into an image which is in some measure useful, wholly ignoring those having no focalizable worth or value.

When there is an excess of illumination from rays emanating from extraneous objects, so great an illumination as to blanket the focalizable image desired, we sense a certain degree of glare. But

there is a tremendous factor of mental discrimination between the intensity of overpowering glare from extraneous and unfocalizable rays and those which fall upon the retina and eventually reach the sensorium, i. e., that portion of the brain which presides over visual pictures.

The light of the northern sky on a clear June day in the middle latitudes is of the order of ten-thousand foot candles; with light fleecy clouds it is almost the same; of moderately cloudy days about five thousand foot candles; of daylight within homes but from 25 to 10 foot candles; of churches about five foot candles; of stores not as a rule to exceed 10 foot candles away from the windows. Night illuminations range from the most brilliant of 20 foot candles or so down to 5 to 3 foot candles; while we readily distinguish objects out of doors, in shrubbery, in shaded places, on nights devoid of the moon and under cloud down to a fractional candle power of one-tenth and even less.

Adaptation of the retinal and mental mechanism of eye and mind has a tremendous influence upon the sensation of glare. If the eye is dark-adapted it is some moments, some minutes in fact, before it can adapt itself to a moderate volume or intensity of light. Under dark-adaptation, when meeting the headlamps of a car the eyes are "optifozed" to such an extent that we do not succeed in focalizing the necessary rays emanating from those objects of regard upon the highway, and yet we are certainly not in the slightest degree 'suffering from a defect of vision, ailment of sight, or pathological condition.' We might say that we are suffering from light adaptation in the *positive* sense, due to a sudden influx of light. Reversing the process, we go from a brilliantly illuminated place into one of very low illumination, stepping from a bright room into a darkened one, and we here have *negative* adaptation to illumination, the reverse condition of glare. Surely if the former were a pathological condition we must consider the darker spot a "cure."

Rays of light emanating from a brilliant source of close proximity are so divergent that the optical properties of our eyes are unable to cause the necessary convergence for a focus, hence divergent rays from powerful lights like the automobile, are unfocusable, and by virtue of their being unassimilated into a retinal image, cause a visual disturbance.

The iris controls to a certain limited extent, the volume of influx of light waves. It is notably slow to act, too slow for much of our modern conditions of life, although suited to more primitive conditions of Man, to animals, birds. We are far more dependent upon retinal adaptation than upon iridial, although the time factor is considerably slower in the former.

But there is a different factor of glare which has hitherto

escaped the attention of optometrists, although it will undoubtedly come to the minds of some who have in their youth been known as "camera fiends." We used to take pictures under all kinds of conditions and provocations. Some of us, we will recall, were obsessed to obtain thunderstorms, lightning forks, and those beautiful tumults

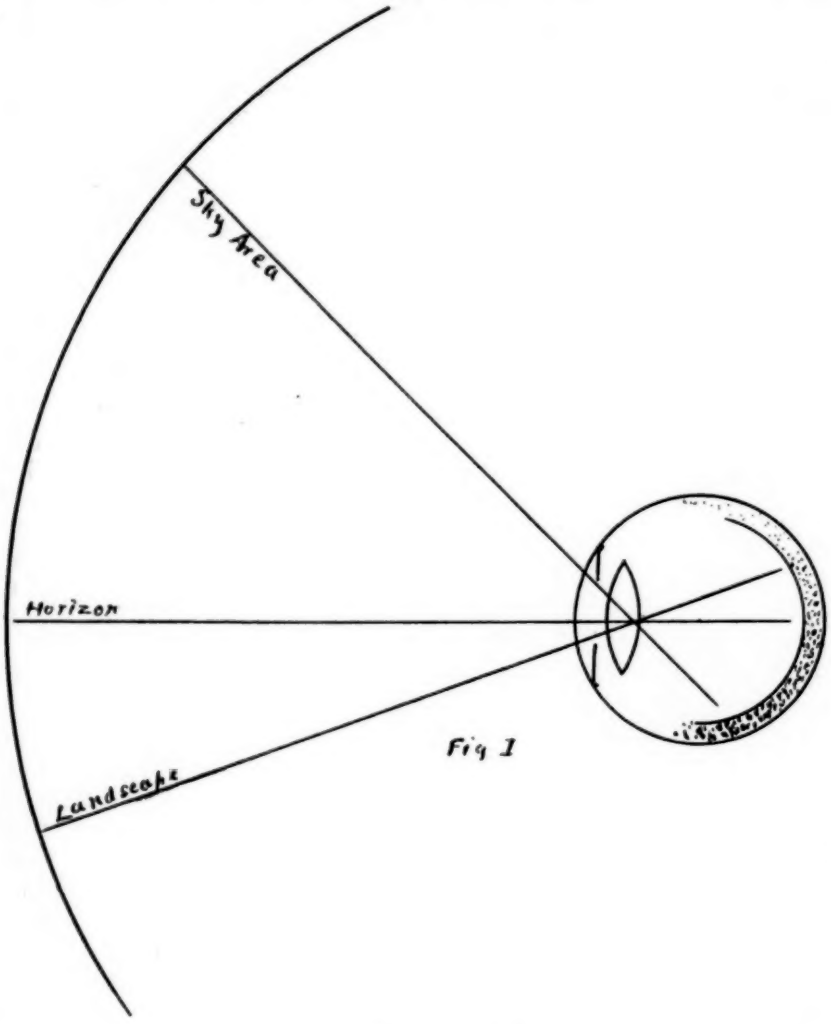

Fig 1

Fig. 1 is intended to convey the idea that the intenser light from above the horizontal plane does not seem unduly intense, since the eyes are normally accustomed to this condition, the lower area of the retina having, through long ages become thus "adapted."

in the heavens, the cumulus clouds. Well, it was often possible to obtain a beautiful picture of the clouds but the scenery of earth was a mere blank—"underexposures" we called them. And when the land or sea scapes were acceptible, lo! the clouds were no more, having been grossly over-exposed, and wholly developed out when the scapes came up. So we developed "cloud filter" lenses which were semi-colored pieces of glass which "retarded" the skylight over a certain area, usually about a half, while being clear glass over the other half. With these ray filters we got both heaven and earth, sometimes the waters beneath the earth, successfully timing a "standard plate" having a fixed speed over its entire surface to the excessive intensity of sky and the low candle power of landscape.

Which term "standard plate" now brings me round to the point we wish to investigate. By virtue of the use of our eyes, their retinas are wholly unlike photographic films and plates, equally sensitive to impinging rays over their entire surface, but have become adapted to unequal intensities of sky and earth in those portions receiving the bright and the darker pictures. The upper portion of our retinas are far *less* sensitive to light than the lower portions, since the light of the sky, from ordinary room illuminations, from the sun, and all *usual* sources, falls upon the lower half of the retina which has been adapted for high intensity for ages. Change this condition to any appreciable degree and we have another type of glare wholly different than anything previously described. I shall make no attempt to coin an euphonious name. The glare from a headlight does not fall upon the lower retina but upon the upper segment which is unused to strong light.

Light which is reflected from the sun or open sky upon the water is reflected by it upon the upper retina and causes great ocular distress. The light from the water is no more intense, indeed it is far lower in intensity, than that emanating from the sky and also impinging upon the lower retina, but it is the reflected light onto the upper field which causes us genuine anguish.

Light from the sun or the clear sky reflected upwards from a smooth asphalt road, while we are driving "toward the light" causes intense ocular distress, while the same light from the sky, falling as it always does, upon the lower retinal segment, never gives us a thought.

Light shining from a window, or an artificial source, and reflected from a glass desk-top, or a polished surface, thus glancing into the upper retina causes pain, although the unreflected light is never given any heed.

Snow blindness by those who travel upon snowshoes and are obliged to gaze steadily at their pathway, is nothing other than the intense illumination falling upon the upper retina which cannot

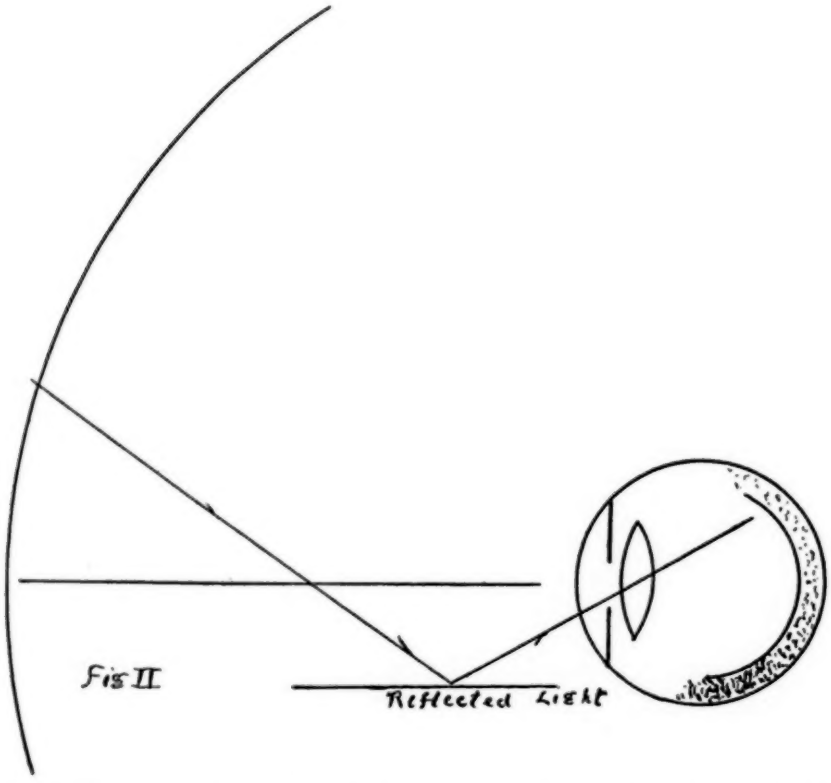

Fig. II is intended to show that strong light from above the horizontal plane, reflected by water, snow, sand, shiny highways, desks, paper, and the like, as received upon the upper area of the retina to which it is not accustomed. Light-adaptation takes place equally over the entire area, the retina adapting integrally, but being so constituted as to react no more to high sky-intensity in the lower segment than to ground-intensity in the upper portion.

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adapt itself. Eskimos fashion a plate of bone or wood with a narrow horizontal slit so as to cut out the reflected rays to a great extent, although the illumination of their sky is far less than that of ours, or those of the tropics. By virtue of the narrow slit the sky rays, which are of no value, are eliminated, the snow-reflected rays are enormously reduced, and only sufficient of those necessary are allowed to enter the eye for focalization. (Figure 2).

Residents and travellers in tropical countries do not complain of inflamed eyes due to glare, as do those who visit the lands of eternal snow, although tropical light is very much more intense. But

tropical illumination falls upon earth, green foliage, dark objects and is reflected to the upper segments of retinas, thereby being toned down. The same travellers, going across the Sahara or other desert sands, will again complain of glare, once more a clear case of irritation of the upper retina. Undoubtedly if lenses were made with suitable tinting in the lower segments so as to reduce the reflected glare there would be little or no complaint of the light from above the skyline. Such lenses would be highly unsatisfactory for automobile driving by night, however, since the eyes are dark-adapted and the sudden glare shoots into the upper segment instantly, and is gone before any degree whatever of adaptation can occur. Lenses of this nature might be convenient at times for daylight driving against the sun, or on the water.

However, this article is not written either in the interests of inventing a lens, or stimulating such invention, but rather to call attention to a physiological factor we have apparently wholly overlooked in our discussions of Glare, that the upper retina is by the very nature of our environments, so constituted as to be far more sensitive to a definite candle power of illumination than the lower portion, receiving as it has, the illumination direct from the heavens during the times of our own existence, as well as our heritance.

Glare has received more or less cursory attention of late, but unfortunately it seems to be getting a pathological slant, which is highly incorrect. But worst of all, there are many types of Glare, whereas it is commonly considered under one heading, which again is even more incorrect.

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A CASE OF OCULAR-HYSTERIA DUE TO FEAR IN A CHILD

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I wish to report a case which to my mind is both singular and unique. Several times I have read of cases of so-called Ocular-Hysteria in which the patient to all external appearances and by all objective tests should have had normal or nearly normal vision but subjectively these patients were found to be very far from normal. These cases after careful experimentation were finally diagnosed as "Ocular-Hysteria" and after removing the cause, vision was normal or nearly so.

Now as I am just entering my second year of practice my experience in the unusual and phenomenal has been limited. However, I believe this case to be worthy of more than passing interest.

Patient Miss Winifred W., age 11, accompanied by her mother called at my office last August. I had previously made a visual survey of the school children in my vicinity and found her vision to be but 20/30, consequently her parents were notified and an ocular examination was advised.

I took the patient into my refracting room and as was usually my habit, invited her mother to come in with us. The patient had no sooner gotten into the chair when her mother began, "Now Winifred, sit up straight, tell the doctor just what you see, don't you dare tell any lies for remember this is costing mother a lot of money" etc.—etc.

My refraction disclosed, to be brief, a visual acuity of O. U. 20/200.

Ophthalmometer, O. U. ½ D. Axis 180°.

Skiametry, O. U.—0.50 D. Cyl. Axis 180°.

This naturally gave no result subjectively. In fact I could not get any better than 20/200 subjectively. I made every test at my command but to no avail. I next consulted her mother in regard to patient's history which was negative—I then sent her to a physician for a Wassermann which also proved negative. A dentist pronounced her teeth satisfactory.

The case was apparently one of amblyopia but I could not satisfy myself that this was the case. I therefore gave the patient a pair of O.U. + 2.50 D. Sph. for constant use with instructions to return in one week. When she returned the mother told me how she had

been co-operating with me, she had she claimed even whipped the child to make her wear the lenses.

Another examination yielded the same results but I noticed this time that the child was nervous and fidgety and kept looking at her mother out of the corner of her eyes. This gave me an idea;—I instructed the mother to send the child in next day alone.

When the youngster returned I sat her down near me, gave her some candy, ate some myself and proceeded to talk about all the interesting childish things I could think of. Before I realized it the child had changed from a nervous and serious little girl to a happy minded child perfectly at ease.

We went into the refracting room and I joked about the instruments and told her funny stories with the following result: A pair of O. U.—0.25 D. Sph.—0.50 D. Cyl. Axis 180° gave her a normal acuity of 20/20.

The child it seemed was afraid of her mother, afraid of me, and in short she was in an hysterical state of mind and by relieving the cause I brought about perfectly satisfactory results.

DR. PHILIP DEANE,
LINCOLN, MAINE.

THE EFFECTS OF ABSORPTION GLASSES ON THE NERVOUS SYSTEM, WITH A FEW NOTES ON THE CHANGES EFFECTED IN PATIENTS' BLOOD PRESSURES BY THE USE OF THESE GLASSES

J. C. Baxter, Opt. D.
New Bern, North Carolina.

Absorption glasses are usually prescribed according to the idiosyncrasy of the patient or optometrist, with little regard to the general effects that such lenses may have upon the physiology of the eyes, and even the entire body.

Reed found that by placing a quartz glass tube in a blood vessel of a dog and exposing the blood running through this tube to artificial light, that the pressure of the blood was depressed on an average of 68%. Some of the dogs died.

Brosius found in the Panama Canal zone a group of well developed and nourished patients suffering with weak, rapid and irregular hearts, low blood pressures, gastric neurosis and headaches, with progressive weakness and fatigue; all of whom were relieved by the use of solar helmets.

Light is the most potent power known to science. Antillus treated rickets with sun light and massage in 300 A. D. Mayo found, "Wave lengths of ultra violet are most important in stimulating the chlorophil (green of plant life) the hemoglobin of blood cells and the photo sensitive plate. These rays lower blood pressure, somewhat increase the oxygen of the blood and blood calcium, the activity of the endocrine glands and the storage of iodin by the thyroid. Ultra-violet rays increase vitamin A, in fact, can develop it in linseed oil."

In a series of experiments with Dr. Joseph Latham, the writer has found that by irradiating the eyes with lights of medium intensity the pulse rate was increased and the blood pressure markedly lowered. Dr. Reed, who performed similar experiments on dogs under ether, also noted the same results, in the lowered blood pressure. He assumed that the main effects were due to the irradiation of the blood in the rich retinal capillary bed on account of his experiments being performed with both vagi and optic nerves cut; also because irradiation of the capillary bed of pharynx produced the same results. The vagus nerve that Dr. Reed cut is a division of the para-sympathetic system, and some of its chief functions are to slow down the action of the heart and lower the blood pressure. These experiments did not exclude the possibility of the stimulation coming through the nervous system and affecting these vital functions by reflex or re-

ferred irritation. There is no direct stimulation of the 10th or vagus nerve through the eye and indeed neither is any called for. Therefore, we are led to believe that the various responses of the vital organs by the irradiation of the eyes to be through the communicating nerves of the eyes to those of the other organs by a referred or relayed system.

We know that the eyes contain the most highly developed system of nerves in the body, and since excessive light appears to be a factor in producing in the nervous system morbid changes, resulting in functional disturbances all over the body, and the eyes seeming to be one of the pathways for the entrance of these disturbances, we are led to believe that the over or under stimulation of the eyes by light is the cause of many systemic diseases of the body, and that optical defects that interfere with the focusing of light upon the highly organized nerves of the eyes are a prime factor in producing these morbid changes. It, therefore, seems well, not only to think of restoring vision by the use of lenses, but to also consider the probable systemic results of these lenses. For instance, suppose that the patient has a very low blood pressure, and a high manifest error of refraction, it is evident that upon its correction that considerable more light would be focused on the nerves of the eyes, and probably result in a still further reduction of the blood pressure. On the other hand, suppose that if the blood pressure was high, perhaps the lenses would favorably influence it, or if the eyes were subjected to a very strong light, which resulted in the train of morbidity as described in the Panama Zone, it would then appear that the tinted lenses that absorbed the irritating properties of light would help.

We are well aware that one is unable to base a scientific fact on the results of a few seemingly well established successful results that we have observed, but hope, with the help of others, to more firmly establish our hypothesis. In one case of the writers, however, we found a stubborn systolic blood pressure of 190 with advice from her physician to forego a trip to the mountains for her health. The correction of a compound myopic astigmatism resulted in an immediate depression of the blood pressure to 160. We believe that if we had shut out the light that we had focused upon the macula with our lenses by the addition of a heavy tint to her correction, that another history would have been written here, as we now see that the exposure of the eyes to light will lower the blood pressure.

It is obvious that we must have a working knowledge of the physiologic responses of the eye to its stimulation by light and of the relations of their stimulation to the nervous system and to the other vital functions under the domain of the nerves that are involved, and further how to group the symtoms caused by the stimulation of a nerve and the system that is connected with it.

The excessive stimulation of the central nervous system is apt to extend into the autonomic or sympathetic nervous system, with

a corresponding upset thereof, and as the latter system controls the functions of the iris, ciliary body and convergence, the disturbance may cause binocular imbalance of accommodation and convergence. If the stimulation is by strong lights or glare, then, tinted lenses that absorb the irritation will be indicated.

The sympathetic nervous system controls vital functions of the various organs of the body. It is divided into two divisions: One of them chiefly stimulates motor and secretory activity, and the other inhibits these functions, thus they are antagonistic to each other. In health a certain equilibrium or poise is maintained between the two systems.

The para-sympathetic system retards the action of the heart, stimulates the iris, accommodation and convergence, the superior and inferior oblique and inferior palpebrae muscles, dilates the blood vessels, thereby lowering the blood pressure, and stimulates motor activity of the gastro-intestinal tract.

The other division, which is the sympathetic system, mainly opposes the action of the para-sympathetic. It speeds up the heart, contracts the vascular system, thereby raising the blood pressure. It inhibits the motor and secretory activity of the stomach and intestines, causes small intestinal cramps, diminished accommodation and convergence and dilates the iris.

The local stimulation and irritation of any branch of these nervous systems are apt to set up a referred disturbance in any other part or organ of the body that communicates with the nerves that are irritated. We have proof of these referred disturbances, seeing many refractive and muscular anomalies results in serious stomach and digestive disorders. The irritation of the iris in iritis generally causes spasm of the accommodation.

As we see that the irritation of the eye is often referred to other far remote organs, we do not think it strange when we see an irritation referred from the accommodation to the convergence, or excessive stimulation of the convergence to accommodation. The same nerve that stimulates accommodation and convergence also communicates with the iris, therefore, we usually find in hypermetropia a small pupil and in myopia a large pupil.

Seeing the intimate relations and co-ordination of the functions of the iris, convergence and accommodation, why should not the excessive stimulation of the iris call for a reflex response of the accommodation or convergence?

The consideration of this hypothesis led the writer to conduct a series of experiments extending over a period of several years. These studies, in which we never exposed the eyes to bright lights more than five minutes, resulted in most of the cases in no measurable changes in convergence, and none in accommodation. Some of them developed slight esophoria and a few of them demonstrated marked esophoria. Those patients who were slightly esophoric to

begin with, seemed to show the greatest response. The writer's eyes being slightly esophoric, reveals an increase of esophoria as high as 15 prism diopters. This patient runs a low blood pressure, almost any kind of excessive light or glare causes depression and a very uncomfortable pair of eyes. By grouping his symptoms we are led to suggest that the para-sympathetic nervous system is over acting and that a tinted lens will be gratefully accepted.

As light does not call for a response of either the accommodation or convergence, we must assume that the esophoria resulting from the irradiation of the eyes to be due to referred stimulation from the iris to the converging muscles, and we believe that the continued exposure of the eyes to excessive lights or glare may likewise result in spasm of the accommodation and other disturbances all over the body.

After the correction of referred convergence excess in hypermetropia by plus lenses only partially corrects the esophoria, we may then attack the convergence through the iris by removing the excessive stimulation of the iris by light, through the use of tinted lenses that absorb the irritating properties of light.

It is clear that a working knowledge of the physiology and anatomy of the "human machine" is essential in order to grasp the deep and significant possibilities of the science of optometry.

The consideration of the local and systemic disturbances resulting from the irradiation of the eyes to light, as presented in this paper, leads us to suggest a scientific basis for the use of tinted lenses, with the hope that others may also follow the lead and add to our findings and conclusions, as follows:

Conclusions

Cases in which spasm of accommodation, convergence and iris are found collectively or singly, tinted lenses are indicated. Convergent squint is favorably influenced by the medium or heavier shades of lens.

Tinted lenses should be used cautiously, if large pupils are found, and are not usually indicated in exophoria, low accommodative reserves and convergence insufficiency.

Clear lenses are indicated in divergent squint.

Tinted lenses of the medium and high shades may favorably influence low blood pressure.

All manifest errors of refraction should be corrected in high blood pressures. No tints should be incorporated in these corrections.

Latent hypermetropia corrections should be determined in fairly dark rooms and the lights on the retinoscope kept as low as accurate work will allow.

DR. J. O. BAXTER,
NEW BERN, N. C.

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IMPROPER DIET AS THE CAUSE OF HEADACHES

As is known, the majority of headaches are located in the front of the head, but any part of the cranium may be the seat of the pain, or the ache may be diffused over the greater part of the head. The knowledge of the location of the headache is of value to optometrists in determining the cause which produced it, although we cannot say with absolute certainty that a headache resulting from any particular cause will always be located in the same part of the head.

Headaches due to eye strain or what is more properly called visual fatigue are usually located just above the eyes or in the temporal region, and the indigestion or constipation headache due usually to improper diet is in the forehead and front of the head, sometimes reaching to the top of the head. Those caused by digestive disturbances are also at times, found in the lower and back part of the head in what is known as the occipital region.

Headaches caused by irritation or disease of the pelvic organs are often located in the back and lower part of the head; the headache of neurasthenia is very often diffused all over the head. The headache of hysteria is often located in a spot on top of the head, which in this type of headache seems very tender to the touch. Toxic headaches due either to poisons taken from without or poisons generated within the body, are usually located in front of the head and in the temporal regions.

It is therefore obvious that many disorders resulting in headache, when not due to eye strain are due to improper modes of living and as optometrists it therefore becomes necessary for us to differentiate between the visual fatigue headache which we can correct by optometric means and those headaches resulting from digestive disorders, focal infections, toxic conditions or general improper living, particularly with reference to food consumption.

It is therefore obvious also, from the foregoing that most of the headaches not caused by visual disorders and foci of infections are caused by improper diet. In other words most digestive disorders or disorders of the elementary tract are, in a large sense at least traceable to improper diet, and the fact also, that there are no outstanding or marked ocular symptoms due to improper diet frequently encourages optometrists to ignore the important hygenic subject, that of diet.

On the other hand, the effects of improper diet on the patient's general health must not be underestimated for as the eyes are a part of the body we must remember that improper diet will in time react upon the visual centers, the optic nerve and the other organs of sight, just as improper diet, will in time, undermine the many other health factors which are so essential to our well-being.

To briefly review the subject of normal or correct diet, let us first remember that from 10% to 20% of our total food calorie consumption should consist of the protein or acid forming foods. These foods are the tissue builders and consist for the greater part of wheat and corn products, all cereals, plums, prunes, eggs, meats, and fish. These foods are essential to our well being but we must remember they should be partaken of sparingly, particularly by adult patients whose occupation is of such character as to require little physical energy. The fats are next considered. Only from 20% to 30% of our total food calorie consumption should consist of fats, the heat and energy food, though this figure might be raised somewhat in extremely cold weather. Therefore the remaining 50% to 80% of our total food calorie consumption must come from the starch, sugar and vitamin (usually alkaline) foods. These foods are used for energy building and oxidation, a few of the most common consisting of apples, asparagus, bananas, beans, carrots, cabbage, celery, muskmelon, oranges, radishes, raisins, peas and potatoes.

Torbett, writing on this subject in the November 1928 issue of the *American Journal of Physical Therapy* says: "Moderate amounts of butter, eggs, bran or whole grain bread eaten once daily with some lettuce, raw cabbage, spinach, cauliflower, green peas, pineapple, tomatoes or good milk, all of which contain all the three vitamins A, B and C, will furnish all the body needs if digested and assimilated. One or two of these foods eaten every day but changed frequently will be sufficient."

In the preceding paragraph Torbett introduces the subject of vitamins. I will briefly review the physical need and value of these health-giving qualities of certain foods as follows:

Vitamin A is found in milk, butter, egg yolk, cod liver oil and some green raw vegetables. Patients using a diet low in vitamin A are usually found to have a lowered resistance to infection.

Vitamin B is found in yeast, green leaves of spinach, lettuce, cabbage, celery, beans, peas, bran and eggs. Vitamin B are not destroyed by ordinary temperatures. Patients using a diet deficicent in Vitamin B are usually found to be suffering from beriberi,—loss of appetite, malnutrition and poor growth.

Vitamin C is found in citrus fruits, tomatoes, lettuce, cabbage, spinach, onion, fresh peas and other uncooked fruits and vegetables. Vitamin C are destroyed by heat and also by alkalies, except in tomatoes.

Vitamin D is supplied by ultra-violet radiant energy. A deficiency of Vitamin D causes rickets and impaired calcium metabolism. Certain foods exposed to these short wave lengths of light seem to aid in curing children affected with rickets.

Vitamin E is found in certain seeds, leaves, cereals and olive oil. Vitamin E is said to be essential to reproduction.

These are briefly the essentials of a normal diet and as optometrists we are not in any way going out of our province to co-operate with the family physician in assuring ourselves that our patients are not only as ocular-perfect as we can make them by optometric means, but also to assure ourselves that as far as their diet is concerned that they are consuming the proper foods in both the proper manner and quantity. By giving careful attention to these matters of diet, certain patients whose headaches have not been relieved by the application of optometric measures could in many cases be immeasurably benefited.

C. C. K.

BOOK NOTICES

THE MODERN TREATMENT OF BINOCULAR IMBALANCES. R. M. Peckham, Opt. D., F. A. A. O. Published by the Shur-on Standard Optical Co., Geneva, N. Y. Foreword by E. Leroy Ryer, Opt. D., F. A. A. O. 184 pages. Illustrated. 1928. $2.00.

This book is a well written review of the results of Peckham's clinical researches. His years of refractive study lead him to believe that nearly all of the binocular imbalances which we as optometrists are called upon to overcome originate because of misuse by the patient of the convergence-accommodative function. Of course he excludes from this, those imbalances resulting from toxemias.

He claims also that pupillary contraction is an associate of convergence rather than accommodation and gives several diagnostic points which if substantiated by later investigators will undoubtedly prove of immense value in certain cases of young hyperopic esophores with large pupils.

The base-in prism, he also claims, inhibits the activity of the adductors withdrawing tonicity impulses from them, diverting this tonicity to the abductors, which in many cases he has found to be in a state of lowered tonicity. In this connection he again emphasizes that fact that there is no such a thing as a prism in a position of rest. A prism always innervates the muscle beneath its apex, adding to its tonicity.

It must be remembered in reading this work by Peckham, and every optometrist should read it, that the results contained therein are the findings produced clinically. Not all of his theories can as yet be accounted for in a purely academic way. It is this fact that that irritates certain of our practitioners when discussing the unusual work Peckham has been doing. For instance, his work with myopia. Here he has found, as have many other optometrists, that the development of myopia can, in certain cases, be retarded, and even in some cases can be entirely cured by the proper application of base-in prisms and base-in prism treatments. This book gives the clinical experiences he has had with the therapy as well as his therapeutic measures which he advises, but it does not give the physiological reasons for the changes which we see take place when these therapeutic measures are employed on these myopic cases. He believes, but he is not sure, that the use of base-in, in these cases, withdraws certain tension from the muscles thus increasing the circulation of blood to the retina, which may account for the improvement. However as time passes the clinical results will, in themselves, produce the physiological bases for the therapy. The thing as the reviewer sees it at the present time is now a need for a differential diagnosis which will more clearly enable one to know just when to apply the base-in prism treatment.

It must also be remembered in reading this book that the splendid work of Peckham does not necessarily upset and discard all of the work done on this subject by Savage, Stevens, Sheard, Maddox, Robinson, Higley, Wilkinson, Worth, Wells, Thorington, Donders, Laurance and others. Peckham's work, does to be sure, throw an entirely different light on certain angles of the subject, which may at first, seem to refute entirely the teachings of these men, but a more careful study will show, that Peckham has in reality added to, rather than taken away from, the accepted theories on which all of our former work was based.

In this book, as is usual with the introduction of a new therapy, its founder is apt to become slightly dogmatic, many more or less

positive statements are made which time will temper, as it will also in all probability alter the views and opinions of those of our leaders who held what might now be termed orthodox views on the subject.

That Peckham has done an outstanding piece of research work, none can deny. Just how far reaching are the effects of his study none at this early date can prophesy, yet his influence will unquestionably be world wide. Through Peckham, optometry has given civilization something which justifies its existence as a profession.

C.C.K.

THE PRACTICE OF REFRACTION. W. Stewart Duke-Elder. M. A., D. Sc., Ph. D., M. D., F. R. C. S. Published by P. Blakistons Son & Co., 1012 Walnut St., Philadelphia, Pa. 208 Illustrations. 410 pages. 1928. $4.00.

It is almost to be regretted that the Blakistons Son Company brought out this work on ocular refraction at the same time that Atkinson and Woll's Dynamic Skiametry and that Peckham's work on Ocular Imbalances made their appearance. However, it is published and optometrists must simply forego other reading and get all three of these splendid books. No optometric practitioner can afford to miss the stimulating mental treat produced by the careful reading of these outstanding works.

Duke-Elder, one of London's foremost ophthalmologists, recent author of "The Nature of Intra-Ocular Fluids" and also, "Recent Advances in Ophthalmology," needs little introduction to American optometrists. As one of the world's original thinkers, in matters pertaining to ocular diagnosis, he stands today at the fore of his profession, and this book which he has just written again stamps him as a man who is well versed in ocular refraction as well.

Sections I and II which are divided into ten chapters, deal with the optical and physiological principles involved in refractive work. Each type of refractive defect is dealt with individually as to its etiology, optical condition, clinical symptoms and treatment. Sections III and IV deal with accommodation and convergence. The universally accepted theories are given in a clearly easily understood manner. No mention, however, is made of the work of Peckham and constitutes the only real deficiency of the book. Sections V and VI deal with the various technics employed in making an ocular examination. Each step of a routine refraction is gone into at some length with the exception of the use of the ophthalmometer which is given but several short paragraphs. These two sections contain much of interest and it would be in these that the optometric practitioner would find the book a valuable aid, in improving his technic.

C. C. K.

HIGH FREQUENCY PRACTICE. (New Fifth Edition, Second Printing). Burton Baker Grover, M. D., Ex-President Western Association of Physical Therapy. Rewritten and enlarged, 632 pages. 73 illustrations. Published by The Electron Press, 115 East Thirty-first Street, Kansas City, Missouri. 1928. Price, $6.00.

In this as in previous editions of High Frequency Practice, Grover has proven himself to be a master of this interesting subject, taking up as he does the subject of electricity from a theoretical and practical standpoint, elaborating also upon the physiologic effect of the various currents upon the various structures comprising the human system. Grover has carried out a considerable amount of research on the effect of the application of diathermy under varying conditions and presents the results through both his writings and illustrations in a most simple and interesting manner.

While the book was evidently written for the general medical practitioner, still it contains many points of interest to the specialist on the eye. Particularly so is the chapter devoted to the treatment of ocular disorders. In discussing the application of diathermy in cataract cases he states that "reports of investigations along this line are widely at variance. Occasionally enthusiastic reports of cures by this method appear in medical literature, while a much larger number of reports agree that after trials extending over long periods of time no appreciable benefit could be observed. The variance of reports is probably due not so much to the result of the application of this modality as to the actual condition existing in the many cases in which it has been tried. Cataract being frequently complicated by some disease of other portions of the light-receiving apparatus in which an improvement of vision may result from any or no treatment, makes the claim for beneficial results for any method of treatment appear more or less fallacious. However, the number of favorable reports justify further trial of this method of treatment. If there is any benefit to be derived from this treatment, it must come through the effects produced by hyperemia of the parts about the lens."

Grover lays special emphasis on differential diagnosis and suggests a special technic for the treatment of each type of case.

J. I. K.

GALVANIC CURRENTS AND LOW VOLTAGE WAVE CURRENTS IN PHYSICAL THERAPY. G. Benton Massey, M. D. and Frederick H. Morse, M. D. Published by The Falcon Press, 36 India Street, Boston, Mass. 190 pages, 65 illustrations. 1927.

In writing this book on Galvanic Currents Drs. Massey and Morse have supplied a long felt need. While there has been considerable

written of late on the subjects of high frequency, diathermy and radiant energy, very little has been written on galvanic and sinosidal current. There is a mass of useful information on these subjects to be found in this book.

The first few chapters of the book are devoted to the description of the electrical principles underlying the galvanic current, its therapeutic reactions from a chemical standpoint as well as the technic for general application. Of special interest is the chapter on Galvanic Current in Ophthalmology suggesting special technic for specific cases. For instance discussing incipient cataract and retinitis pigmentosa they claim that it is indisputable that a negative application to the orbital contents with moist cotton in an eyecup electrode will extract bases from the molecules of nearby tissues, precipitating them on the metal plate at the bottom of the cup, the extraction being in direct proportion to the milliamperage and its duration. Retinitis pigmentosa has been reported as favorably affected by negative galvanism, doubtless due to the extraction of the bases of the deposited pigment. In the chapter on Electrodiagnosis the authors tell of certain methods of testing to determine whether the muscle or the nerve is at fault in certain cases. J. I. K.

ABSTRACTS

SOME EXPERIMENTS WITH BINOCULAR AND MONOCULAR VISION. E. M. Lowry. Communication No. 380 from the Eastman Kodak Research Laboratories and read at the annual meeting of the Optical Society in Washington, D. C., November, 1928.

An account is given of a series of investigations, in which both binocular and monocular vision were used, of the brightness sensibility of the retina. A new type of visual sensitometer is described which enables the operator to determine the brightness functions of the eye in a variety of ways. The instrument consists of a hemispherical bowl, one meter in diameter, equipped with an illuminating system which will give brightnesses from 0.01 to 600 millilamberts. This bowl serves as the sensitizing field. A mechanism is provided by means of which the threshold for brightness may be determined at any adaptation level. Contrast sensibility may also be measured at any brightness as well as the effect on threshold and contrast sensibility of introducing various objects into the visual field. In addition, monocular and binocular acuity may be determined by using the Ives form of acuity meter. Data and curves are given representing the results secured for a number of observers. Emphasis is laid on the necessity of determining binocularly the various functions of the eye if they are to be correctly interpreted in practice.
M. A. Yerger.

THE DIAGNOSIS OF HETEROPHORIA. T. Gamin. The Commonwealth Optometrist. (Australian) Vol. X, No. 7, pp. 256-257. 1928.

Gamin gives the following symptoms which may attend heterophoria:

1. There may be a slight diplopia at times, and double images are so close together (particularly in near work) as to confuse each other, and produces a blurring of the sight.

2. The attempt to avoid diplopia may produce a peculiar attitude of the head, particularly noticeable in Hyperphoria.

3. The reflex symptoms. These symptoms may consist of asthenopia, pain in the eyes, headaches, conjunctional irritation. There may be pains situated in other parts of the body. Spasms of the facial muscles have been known, and very often nausea, dizziness, digestive disturbances and also debilited conditions.

These symptoms usually are, he claims, the result of the strain imposed on the extrinsic muscles in the attempt to correct the deviation. T. O. B.

OPHTHALMOMETER FINDINGS. W. G. Maybee. (Editorial) Canadian Optometrist. Vol. X, No. 11, p. 334. 1928.

Maybee claims that the optometrist who does not make use of the ophthalmometer as a starting point for each case, misses a valuable aid to diagnosis. While it may be argued that it does not always furnish the amount and position of astigmatic correction, it will be found that practice in its use, will show increased harmony with other findings. Even when readings do not agree, we know the corneal astigmatism and axis, which will be most useful for future reference, whether astigmatism is regular or irregular, with or against the rule, whether the corneal surface is normal, and whether the spherical error is refractive or axial. T. O. B.

FINCHAM SLIT LAMP. H. H. Emsley. The Refractionist. (British) Vol. 17, No. 250, pp. 326-327. 1928.

The arrangement of the Fincham Slit Lamp is, according to Emsley, a decided improvement over some of the earlier types of instrument. The microscope and illuminating system is mounted on a circular arc which has as its center of focus the illuminating beam. As a consequence of this design, the image of the part of the eye under examination is automatically brought into the center of the field when the slit lamp is focused on it. T. O. B.

THE OCULAR TENSION DURING ACCOMMODATION AND CONVERGENCE IN THE NORMAL AND IN PATHOLOGICAL STATES. Abstract by H. Neame. The British Journal of Ophthalmology. Vol. 12., No. 10., p. 544. 1928.

Neame abstracts a paper from a French Journal of Ophthalmology in which Slavati took measurements of the ocular tension by means of Bailliart's tonometer on the cornea and on the sclerotic; (1) in the resting state, and (2) with the eye accommodating for a distance of 20 cms. He found the tension in every case higher in accommodation than in the resting state, and the sclerotic tension higher than the corneal. Measurements are recorded for four normal persons, for one chronic glaucoma, and for one detachment of the retina. The difference between the tension at rest and during accommodation varied from about 10% to 25%. T. O. B.

TELESCOPIC SPECTACLES. A. H. Levy. The Dioptric Bulletin. (British) Vol. XXX., No. 11., pp. 439-444. 1928.

A review of the history of Telescopic Spectacles is first given by Levy who then explains the optical principles upon which the use of these spectacles are based. Instructions as to prescribing these glasses for both distance and reading are given as well as a number of precautions to be followed if one is to be successful in getting patients to adopt themselves to their use. C. C. K.

MARKED ANISOMETROPIA WITH BINOCULAR VISION. A CASE REPORT. G. F. Libby. The American Journal of Ophthalmology. Vol. II, No. 10, p. 811. 1928.

Libby reported the case of a man thirty-six years old, with eleven diopters of compound myopic astigmatism in the right eye and five diopters of the same in the left, when first seen by him in 1921. With minus eight spherical lens, which the patient was wearing for the right eye, the vision was 5/30. By adding three diopters of myopic and astigmatic correction, the vision of the right became 5/6 partly, and with the proper correction for the left eye the vision was also 5/6 partly. In spite of the rather extreme anisometropia the patient developed binocular vision and orthophoria in one month. With his lenses he had six diopters of accommodation in each eye.

On reexamination in 1928, the myopia was found to have increased one diopter in each eye; and eight degrees of esophoria and one degree of left hyperphoria had developed. By adding one diopter spherical to the lenses, vision rose to 5/5 mostly with the right eye, 5/5 partly with the left, and 5/4 partly with both eyes together. Again the accommodation was six diopters in each eye, and very comfortable binocular vision for distance and near was obtained.

T. O. B.

THE SIGNIFICANCE OF MYOPIC ACCOMMODATION. S. G. Beer. The Optician. (British) Vol. LXXVI, No. 1963, pp. 203-204. 1928.

Beer claims that, the generally accepted theory that the amplitude of accommodation of a myope is less than that of an emmetrope is wrong and also cites a number of unselected myopic cases and a table of figures to prove that the amplitude of accommodation of myopes is as high if not higher than that of most emmetropes.

T. O. B.

THE CAUSE OF CATARACTS IN INDIA. F. C. Whitten. The Optician. (British) Vol. LXXVI, No. 1962, p. 190. 1928.

Whitten claims that during his stay in India that in all cases where the patient, either European or native, had been exposed over a long period to tropical radiation, there was marked depletion of accommodative power and other evidence of sclerosis of the lens. This has led him to the conclusion that one of the main factors in causation of cataract is the dangerous concentration which takes place in the anterior portion of the optical system of the eye when there is radiation from a large area. T. O. B.

THE DYNAMIC OPTOMETER AND THE METHOD OF USING IT. B. J. Campbell. The Optical Journal and Review. Vol. LXII, No. 11, pp. 21-23. Illustrated. 1928.

This new instrument, when used under muscular and accommodative control gives quantitively about the same information as does dynamic skiametry, claims Campbell, who in this paper gives the routine for the use of the instrument. T. O. B.

THE "MONGOLIAN" EYE. H. Gifford. The American Journal of Ophthalmology. Vol. II, No. 11, pp. 887-893. Illustrated. 1928.

In this illustrated paper Gifford refutes the accepted belief that most Mongolian peoples have slanting palpebral fissures, claiming that only 10% of these people have this facial abnormality.

T. O. B.

A NEW FORM OF TRIAL FRAME. J. P. Price. The Optometric Weekly. Vol. XIX, No. 16, p. 555. Illustrated. 1928.

Price takes an ordinary trial frame and attaches it to an adjustable head-band made of fiber. Opaque fiber discs are also hinged at each side to exclude either eye at will. The use of this device is particularly advantageous in examining children. T. O. B.

ANNOTATIONS AND SOCIETY PROCEEDINGS

The American Journal of Optometry is the official Organ of the American Academy of Optometry, as well as the Organ of the Arkansas, Delaware, Iowa, Maine, Maryland, Michigan, Minnesota, Nebraska, North Dakota, Oklahoma, Pennsylvania, South Dakota, Vermont and West Virginia Optometric Associations.

The following gentlemen have consented to supply items of interest from their respective sections, acting in the capacity of

ASSOCIATE STATE EDITORS

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THE FOLLY OF SECESSION

From two quarters we note talk which indicates that certain State Optometric Societies are considering seceding from the A. O. A. In fact we have been told that one state has already made this move. Just what can be gained by taking a step of this character is doubtful. In the minds of certain men, the A. O. A. may not function as smoothly as might be desired; to some its officers may include among their number men with whom one most heartily disagrees; to others, its national policy on publicity may seem wholly unsatisfactory; or again its Department of Education may not, it might appear be functioning to the greatest good of all practitioners. Yet despite these things optometric need for a great National political organization of the type of the A. O. A. is so pressing and so vital that all talk of seceding should be dropped.

The American Optometric Association is as vital to Optometry as are the professional schools which teach our students or the laws which regulate the practice itself. Without the A. O. A., Optometry would be helpless before any organized group which might care to invade or in any way upset this field. Without the A. O. A. as a meeting ground for practitioners from the several states, much of the progress which has been made, would have been impossible.

We have much to thank the founders of this organization for. In their wisdom they built and developed a well knit and, in a large sense, a well functioning National body. That this organization may continue to serve Optometry is our plea. Secession assists no one

and merely weakens our Optometric position before all other professions. In this first of the New Year the time is now ripe for the level-headed optometrists of all states to quelch the occasional optometric practitioner who, because of some local grievance is usually responsible for this secession talk. Let 1929 be a co-operative year, a year in which all factions of our profession join in welding together a strong active organization,—an organization upon which we can lean with confidence should the occasion arise. Secession means destruction,—co-operation means advancement! Let us all look for the common good.

C. C. K.

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AMERICAN ACADEMY OF OPTOMETRY

The annual sessions of the American Academy of Optometry were held at the Morrison Hotel, Chicago, Illinois, on December 2nd, 3rd, and 4th. Dr. E. G. Wiseman of Buffalo, New York, occupied the chair. The program as arranged by Dr. E. L. Ryer and his conferees was as follows:

Sunday, December 2nd, 1928

10:00 A. M. "Chairman's Address"—Dr. E. G. Wiseman, Buffalo, New York.

10:30 A. M. "A Case of Esophoria and Pseudo-Myopia Corrected With Base-in Kratometer Treatments"—Dr. C. J. Hathaway, Pontiac, Michigan.

Noon "School Visual Surveys." A luncheon address by Dr. Ernest Petry of Rochester, New York. Dr. E. LeRoy Ryer of New York City, presiding.

2:00 P. M. "Remote Ophthalmoscopic Diagnosis"—Dr. A. M. Skeffington, Chicago, Illinois.

3:30 P. M. "The Application of Electro-Physical Agents in Ocular Work"—Dr. Jack I. Kurtz, Minneapolis, Minnesota.

4:30 P. M. "A Case of Total Disassociation of the Fusion Faculty"—Dr. F. H. Robertson, Blackwell City, Oklahoma.

6:15 P. M. "Secretary's Report" by Dr. J. Fred Andreae of Baltimore, Maryland. This report will be given at the informal Round Table Sunday Supper. Dr. Briggs S. Palmer of Boston presiding.

8:00 P. M. "Is There a Zone of Ocular Comfort?"—Dr. Charles Sheard, Mayo Clinic, Rochester, Minn.

Monday, December 3rd, 1928

9:00 A. M. "Invisible Radiant Energy As the Cause of Cataract"—Dr. Carel C. Koch, Minneapolis, Minnesota.

9:30 A. M. "A Case of Cataract Treated With the Calobar Glass Therapy"—Dr. O. J. Melvin, Omaha, Nebraska.

10:15 A. M. "A Study of the Visual Portion of the Autonomic Nervous System"—Dr. E. G. Wiseman, Buffalo, New York.

Noon "Biomicroscopy of the Living Eye," a luncheon address by Dr. W. I. Brown, New Bedford, Mass. Dr. James H. Drakeford of New York City, presiding.

2:00 P. M. "The Permanent Use of Red-glass Before the Fixing Eye in Squint Cases"—Dr. O. L. McCulloch, Holyoke, Mass.

3:30 P. M. "A Study of the Torsions"—Dr. F. H. Robertson, Blackwell, Oklahoma.

7:00 P. M. Formal Round Table Dinner. Dr. E. G. Wiseman of Buffalo, New York, presiding.

8:00 P. M. Presentation of Fellowship Certificates.

8:15 P. M. "Neurological Diagnostic Symptoms in Eye-work"—Dr. W. I. Lillie, Mayo Clinic, Rochester, Minnesota.

Tuesday, December 4th, 1928

9:00 A. M. "Accommodative-Convergence Relationship and Their Use in Interpreting Near-Point Data"—Dr. E. F. Tait, Philadelphia, Pa.

Noon "Reports of Several Cases Treated by Version Stimulation." A luncheon address by Dr. O. J. Melvin of Omaha, Nebraska. Dr. Elmer E. Hotaling of New York City, presiding.

2:00 P. M. "The F-L Test, and My Experiences With It"—Dr. O. L. McCulloch, Holyoke, Mass.

This meeting of the Academy was one of the best attended and most interesting of any yet held. The program was carried out with promptness, the papers given were decidedly interesting and the fellows of the Academy present entered into spirited discussions at the close of each technical paper. These papers will be published later in book form. At the close of the three days of educational sessions the following men were elected to serve the Academy for 1929:

Dr. Carel C. Koch, Minneapolis, Minnesota, Chairman; Dr. E. E. Hotaling, New York City, Vice Chairman; Dr. J. Fred Andreae, Baltimore, Md., Secretary-Treasurer. The Executive Council is composed of the officers and the following men: Dr. W. I. Brown, New Bedford, Mass.; Dr. E. G. Silver, Washington, D. C.; Dr. F. I. Tibbets, Little Rock, Ark., and Dr. A. M. Skeffington, Chicago, Ill. At the invitation of Dr. Briggs S. Palmer, Boston, Massachusetts, was chosen as the meeting place for the 1929 sessions of the Academy.

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A. O. A. MEETING AT PHILADELPHIA

Dr. W. H. Glazer, writing about the coming convention of the American Optometric Association to be held in that city says: "It seems quite fitting, in making comments and recommendations, that we here note the necessity of informing

the world in clearest terms the debt it owes the great pioneers and scientists in the realm of physical and visual optics. I can think of no other scientific body that could be honorably designated as such without the methods and means evolved by the scientists and the science to whom and to which we belong. Astronomy, Mechanics, Bacteriology, Pathology, Surgery, Engineering, and others have had need, not alone of precision instruments, interferometers, spectroscopes, transits, telescopes, microscopes and the like. They needed, too, all that which goes to make up our present day visual science. In brief, I hope at the coming convention here in Philadelphia we shall be able to acquaint ourselves and the world at large with the names and portraits of our own Great and what they did—such men as Donders, Young, Helmholtz, VonRohr, Tscherning, Michaels, Benjamin Franklin, Cross and many others. We belong to them, as they belong to us. Great monuments have gone to statesmen and warriors. Let us, too, perpetuate and honor the memories of our great scientists. It would be just—it would be wise—for Optometry to observe throughout the land one day a year in their honor and perpetuation of their memory."

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MYOCULATOR THERAPISTS MEET

The Cameron Surgical Instrument Company is holding four days of intensive graduate work in the treatment of Squint by means of Version Stimulation and Fusion training as developed by means of the Myoculator. This short course for practicing Optometrists will be held on January 9th, 10th, 11th and 12th at the Maryland Hotel in Chicago, Ill. The speakers will consist of Dr. Carl F. Shepard, Dr. William A. Mendelson, Dr. W. Cammon, Dr. Harry Pine, Dr. H. G. Hill, Dr. E. C. Caffrey and Dr. R. W. Bennett.

This course is being offered to members of the profession without cost but is limited to 240 practitioners. Optometrists planning to attend are urged to communicate with Dr. Alex Cameron, 666 W. Division Street, Chicago, Ill., for reservations at once.

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THE OKLAHOMA ASSOCIATION

The Mid-Year Clinic will be held at the Mayo Hotel, Tulsa, reports Dr. E. E. Alexander, the entire week of January 14. Dr. A. M. Skeffington will be in charge of this post-graduate clinic. He will use actual patients to demonstrate the latest approved methods of diagnosis and refraction. The Board of Examiners in Optometry will hold a business meeting and an examination at the Mayo Hotel, Tulsa, January 15, 16 and 17, 1929. The Board has been reorganized with Dr. E. E. Russell, Altus, President; Dr. E. B. Alexander, Duncan, Secretary, and Dr. W. K. Grady, Stillwater, Member. At the last meeting of the Board of Directors

held at Oklahoma City, October 15, one of our members, Dr. W. O. Smith, of Tulsa, was tried as by the rules of the Association for unprofessional and unethical conduct. He was charged with having advertised prices in connection with his profession. He was found guilty and expelled from membership in the Association. Recent applications for membership in the Association, who were successful in passing the executive committee are: Clarence R. Herron of Okmulgee, and Eunice M. Johnson of Picher. Dr. Herron comes by reciprocity from Missouri. Dr. Johnson was licensed by examination in 1926 and is practicing at Picher.

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CONNECTICUT OPTOMETRIC SOCIETY

The fourth quarterly meeting of the Connecticut Optometric Society, says Dr. G. W. Sweet, was held in New Haven at the Hotel Garde, October 16th. President H. E. Jones presided and appointed a nominating committee to nominate officers for the coming year, and report at the annual meeting. Dr. E. R. Crofut then gave his report as delegate to the national convention.

Attention was called to Dr. A. M. Skeffington's Clinic which was held in Hartford, and a motion was made and passed to send Dr. R. M. Peckham, formerly of Waterbury, a vote of of appreciation for his work done throughout the country. Dr. H. Grossman then introduced the speaker of the evening, Dr. C. R. Padelford, of Fall River, Mass., who spoke on "Prisms in Action."

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A. O. A. DEPARTMENT OF EDUCATION

Dr. Arthur E. Hoare in collaboration with his associate, Dr. F. B. Dozier of Los Angeles, California, announces a new policy with regard to the printed educational material on hand in the Educational Department of the American Optometric Association. These men have arranged to distribute these printed courses at the cost only of clerical work and postage, sending this material to any member of the A. O. A. who would care to secure same. The courses along with their cost per copy are given below.

Anatomy of The Eye, by Ketchum, 10c; Arithmetic, Algebra and Geometry, by Minchin, 10c; Ocular Muscles, by Needles, 15c; General Anatomy and Physiology, by Woll, 10c; Optical Shop Work, by Slade, 10c; Trigonometry, by Minchin, 10c; Refractive and Accommodative Error and their Correction by Subjective Methods, by Maybee, 10c; Static and Dynamic Skiametry, by Sheard, 25c; Practical Lessons in Blood Pressure Testing, by Wiseman, 10c; Ocular Accommodation, by Sheard, 35c; Hygiene, by Woll, 10c; Squint, by Davies, 35c, and The Routine of Subjective Refraction, by Laurance, 10c.

The total cost for the entire set as given above is $2.00.

In ordering any of these study courses the full amount in either stamps, money order or check must accompany the order. No orders filled for less than $1.00. In addition to the above, Drs. Hoare and Dazier will send with each order for the above A. O. A. Educational Literature a free copy of the educational lectures delivered at the 25th convention of the A. O. A. They have also announced that to any practitioner who orders the complete set of study courses as listed above for $2.00 they will include a bound copy of the lectures delivered at the 1928 convention for an additional $1.25. This bound copy was sold until recently for $5.00 the present price being $2.50. All orders for above material should be addressed to the Department of Education, American Optometric Association, c/o Dr. F. B. Dazier, 824 Subway Terminal Building, Los Angeles, Calif.

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NEW YORK OPTOMETRIC ASSOCIATION

Discrimination in favor of routine examinations on the eyes of school children by ophthalmologists was taken up by Dr. Thomas McBurnie, President of the New York State Optometric Association with the result that Dr. James Sullivan, Assistant Commissioner for Higher and Professional Education for the state of New York sent out to superintendents of schools the following notices:

"Complaints have come in to this department that certain public employees have been sending out notices to the effect that when children have poor vision they should consult an Oculist. It is an implication in this, that an Optometrist is not competent to refract the eye. As a matter of fact he has passed examinations and has qualifications to refract eyes as accurately as has any Oculist. To send out such notices is an injustice for the registered Optometrist of the state and I hope you will find it agreeable to instruct the medical inspector of the above facts."

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PHILADELPHIA CONVENTION COMMITTEES

The chairman of the various committees have been appointed to prepare for the coming convention of the A. O. A. at Philadelphia. They are as follows:

Dr. Otto G. Haussmann, General Chairman; Dr. Joseph Rothschild, Chairman of the Hotels Committee; Dr. Morris Rothschild, Chairman of the Finance Committee; Dr. Dudley L. Tice, Chairman of the Reception Committee; Dr. D. W. Jones, Chairman of the Transportation Committee; Dr. T. H. Duir, Chairman of the Program and Printing Committee; Dr. Chester H. Johnson, Chairman of the Publicity Committee; Dr. Albert Fitch, Chairman of the Educational Committee; Dr. William F. McCaffrey, Chairman of the Exhibits Committee, and Dr. John H. Martsch, Chairman of the Registration and Entertainment Committee.

ARKANSAS ASSOCIATION CONVENTION

The twenty-second annual convention of the Arkansas Optometric Association was held at Little Rock on the 8th and 9th of October. The Convention was called to order by Dr. J. J. Livingston, who served as the Association president for the last four consecutive terms. In his annual address Dr. Livingston stressed the importance of amending the State optometry law so as to incorporate the "Constitutional" and "Glazed Goods" amendments. He also reviewed the progress optometry made in that state for the last few years from an educational standpoint.

A number of interesting and instructive lectures were delivered during the convention. Dr. J. S. Murphy lectured on "Subjective Examination." Dr. H. M. B. Hardin, on "Retinoscopy." Dr. F. I. Tibbetts on "Muscular Imbalance." Dr. C. H. Brown on "Case Reports." Dr. J. F. Sisson on the "Evolution of a Rural Optometrist." Drs. C. E. Castelburry and B. M. Wilson spoke on "Legislation," L. C. Bernays and J. L. Green on the "History of Optometry in Arkansas." Dr. A. Weiss spoke on "Problems Confronting the State Board of Examiners."

The following officers were elected for 1929: Dr. J. J. Livingston, President; Dr. C. H. Brown, Vice-President; and Dr. Emmett Thompon, Secretary and Treasurer.

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GAMMA CHAPTER MEETING

The Gamma Chapter of the Beta Sigma Kappa meeting was held at Union City, New Jersey, the 16th of December. President Phillip Jackman rendered a report of the chapter's activities during the year. Among the outstanding activities of the year was the work of the Board of Regents in combating publicity unfavorable to Optometry, and the work of the clinic committee which completed a number of important visual surveys in several charitable institutions, where glasses when needed were furnished gratis by the chapter.

A study class is being organized to further the study of advanced optometric subjects. The chapter adopted the American Journal of Optometry as its official publication and is conducting a campaign to get all of the members to subscribe to this publication.

Plans are being worked out now in co-operation with the officials of the State Department of Charities to have the members of the chapter examine the eyes of the crippled children of the New Jersey State institutions.

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CONVENTION REPORT FOR 1929

Dr. Ernest Kiekenapp, National Secretary of the American Optometric Association announces that orders are now being taken at his office for the 1929 convention report. The 1928 report which was mailed to the members several months ago was decidedly satisfactory and many men are taking the opportunity of at once subscribing for the report which will be issued immediately after the coming convention in Philadelphia.

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BACK NUMBERS WANTED

Dr. Ernest Petry, Dean of the Rochester School of Optometry requests that any person who has one or more of the following back issues of the American Journal of Optometry send same to him at his office at 714 Lincoln-Alliance Bank Building, Rochester, New York. Dr. Petry is attempting to get a complete file of this Journal for the Optometry School at the University of Rochester and would appreciate having the following numbers which are missing from his sets:

Volume 1, No. 1.
Volume 2, Nos. 7 and 11.
Volume 4, No. 4.
Volume 5, Nos. 2 and 7.

We urge any of our readers who can supply Dr. Petry with any or all of these numbers to communicate with him at once as they are to be used by him in the permanent files for the university in that city.

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OPTICAL MATERIAL IN THE FILMS

The firm of Bausch and Lomb, manufacturers of optical material and scientific instruments, announce they have, for the use of any professional organization, a three reel film showing in detail the process of making ophthalmic glass and the various stages of development through which an ophthalmic lens passes before it can be prescribed. The film is made in both the standard and amateur size and will be loaned any optometric organization wishing to use it, at either its own meeting, or at some general gathering. Secretaries of optometric locals should write the Bausch and Lomb Company, Rochester, N. Y., for further particulars.

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MINNESOTA ANNUAL CONVENTION

The Annual Convention of the Minnesota State Association of Optometrists will be held in Minneapolis, Minnesota, on the 10th, 11th and 12th of February. Dr. A. M. Skeffington will be the chief speaker at the convention and will in addition to this hold a week of graduate work immediately following the convention period.

Behind every

SEVENTY-FIVE years of optical experience are behind the Orthogon Lens. Men of vision conceived it. Scientific experts designed it. Mechanical genius produced it. The science of glass making has brought it to its fullest degree of perfection.

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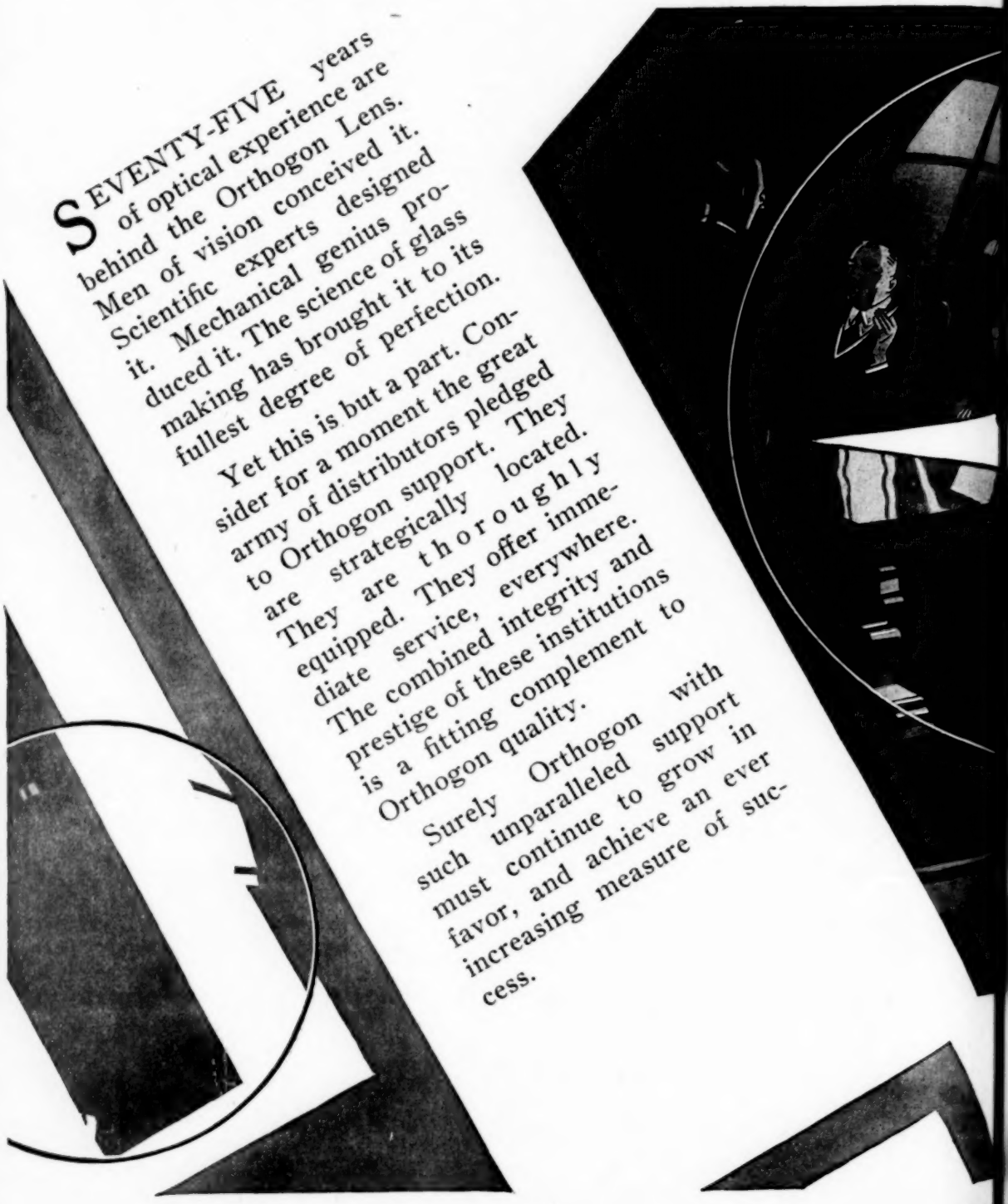
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